WELL LOG AND DRILLING REPORT

T11

599538

NO CARBON PAPER NECESSARY— SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

COUNTY Montgomery TOWNSHIP Mad River SECTION OF TOWNSHIP 31

OWNER Kathleen Kinnegan ADDRESS 2907 Old Troy Pike

LOCATION OF PROPERTY Same

CONSTRUCTION DETAILS

Casing diameter 6 Length of casing 120

Type of screen _____ Length of screen _____

Type of pump Sub

Capacity of pump 10 GPM

Depth of pump setting 100

Date of completion 6 Dec. 1981

BAILING OR PUMPING TEST
(specify one or circling)

Test rate 10 gpm Duration of test 10

Drawdown 4 ft Date 4 Dec 19

Static level (depth to water) @ 52'

Quality (clear, cloudy, taste, odor) Clear

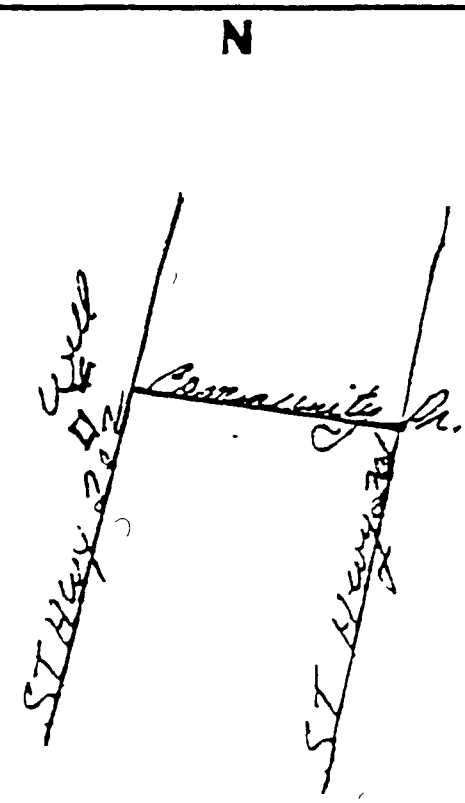
Pump installed by S C Pattison

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
Top soil	0 ft	4 ft
Brn Sand & Gravel	4	52'
Sand	52	90
Sand & Gravel	90	120

SKETCH SHOWING LOCATION

Locate in reference to numbered state highways, street intersections, county roads, etc.



DRILLING FIRM Pattison Well Co. DATE 6 Dec 1981

ADDRESS 2901 S Dixie Dr SIGNED S C Pattison

*If additional space is needed to complete well log, use next consecutive numbered form.

WELL LOG AND DRILLING REPORT

ORIGIN

NO CARBON PAPER NECESSARY - SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Geological Survey
Fountain Square
Columbus, Ohio 43224 Phone (614) 466-5344

478848

COUNTY Montgomery TOWNSHIP Mad River SECTION OF TOWNSHIP OR LOT NUMBER 31

OWNER Mr. Carl Zockerman ADDRESS 2825 Troy Pike, Layton, 4540

LOCATION OF PROPERTY Troy Pike Route 202

CONSTRUCTION DETAILS

Casing diameter [illegible] Length of casing [illegible]
Type of screen _____ Length of screen _____
Type of pump 1 h.p. submersible
Capacity of pump 7 g.p.m.
Depth of pump setting 60 ft
Date of completion [illegible]

BAILING OR PUMPING TEST
(specify one by circling)

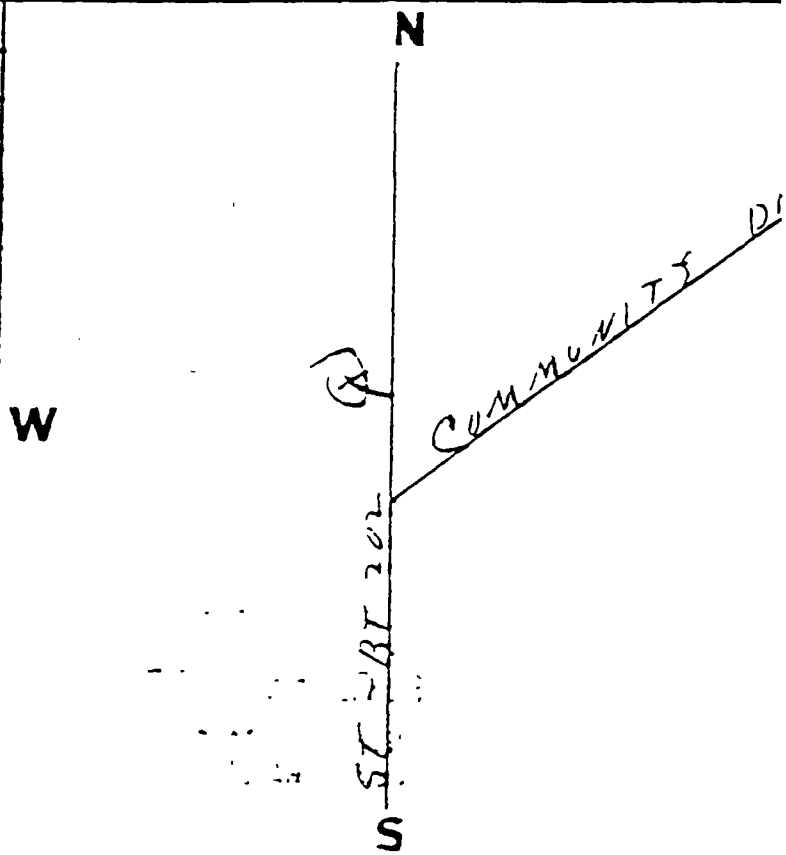
Test rate 20 gpm Duration of test 1
Drawdown [illegible] ft Date 10-7-75
Static level (depth to water) 30
Quality (clear, cloudy, taste, odor) clear
Pump installed by Scott Well & Pump Co

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
top soil	0 ft	3 ft
fine gravel	3	30
nearly hard ca...	30	30
water gravel	30	75

SKETCH SHOWING LOCATION

Locate in reference to numbered state highways, street intersections, county roads, etc.



DRILLING FIRM Scott Well & Pump Co DATE 10-7-75
ADDRESS 5687 Brandt Pike Road, Dayton SIGNED Mrs. Carl Zockerman

*If additional space is needed to complete well [illegible]

WELL LOG AND DRILLING REPORT

ORIGINAL

-NO CARBON PAPER NECESSARY- SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Geological Survey
Fountain Square
Columbus, Ohio 43224 Phone (614) 466-5344

478823 No C

COUNTY Montgomery TOWNSHIP Mad River SECTION OF TOWNSHIP OR LOT NUMBER 24

OWNER William Witt ADDRESS 2503 Troy Pike Dayton

LOCATION OF PROPERTY ½ mile south of Community Dr. on Troy Pike

CONSTRUCTION DETAILS

Casing diameter 6" Length of casing 73 ft.
Type of screen ____ Length of screen ____
Type of pump submergible
Capacity of pump ½ h.p.
Depth of pump setting 65 ft
Date of completion 10-10-75

BAILING OR PUMPING TEST
(specify one by circling)

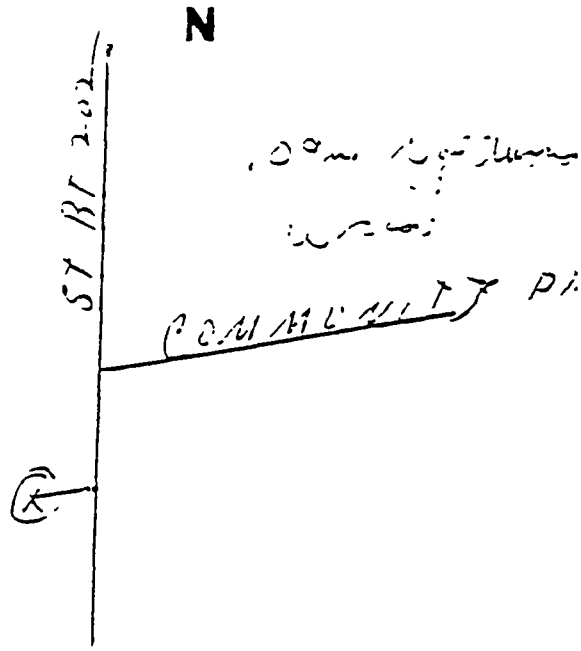
Test rate 25 gpm Duration of test ____
Drawdown 4 ft Date 10-9-75
Static level (depth to water) 37
Quality (clear, cloudy, taste, odor) clear
Pump installed by Scott Well & Pump Co.

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
topsoil	0 ft	5 ft
dry gravel	5	27
hardpan	27	32
mushy sand & Gravel	32	40
water gravel	40	73

SKETCH SHOWING LOCATION

Locate in reference to numbered state highways, street intersections, county roads, etc.



DRILLING FIRM Scott Well & Pump Co. DATE 10-10-75

ADDRESS 5859 Brandford Rd. SIGNED [signature]

County Permit No. 1

WELL LOG AND DRILLING REPORT

ORIGINAL

551557

NO CARBON PAPER NECESSARY – SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

COUNTY Montgomery TOWNSHIP Mad River SECTION OF TOWNSHIP 36

OWNER John Sullivan ADDRESS 2627 Old Troy Pike

LOCATION OF PROPERTY

CONSTRUCTION DETAILS

Casing diameter 6" Length of casing 72'

Type of screen Length of screen

Type of pump Submersible

Capacity of pump 10

Depth of pump setting 73'

Date of completion 4-30-80

BAILING OR PUMPING TEST
(specify one by circling)

Test rate 10 gpm Duration of test 1 hr

Drawdown 20 ft Date 4-24-80

Static level (depth to water) 40

Quality (clear) cloudy, taste, odor)

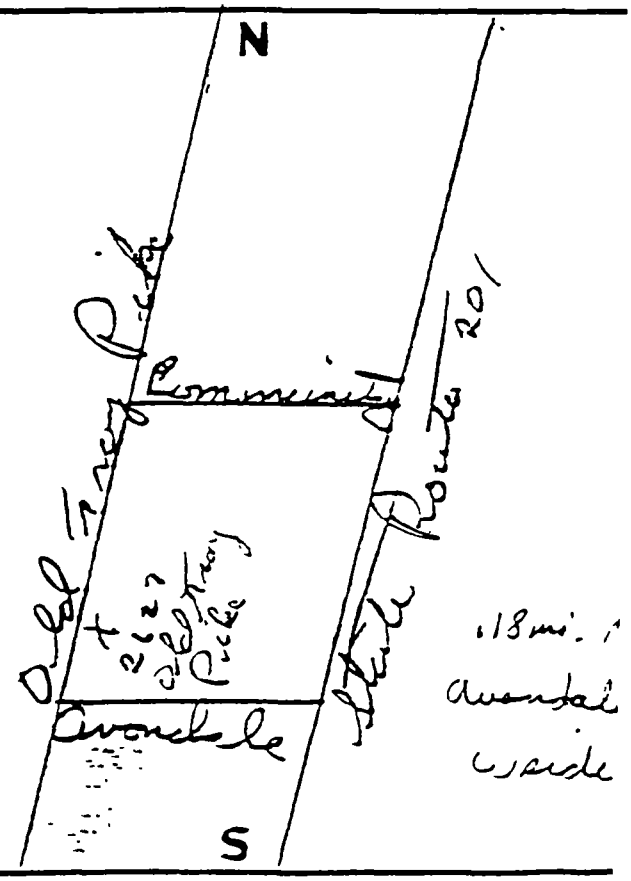
Pump installed by Jenkins Pump Service

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
Topsoil	0 ft	5 ft
Fine Sand	5	45
Brown Clay	45	47
Sand	47	56
Brown Clay	56	64
Fine Sand	64	70
Water-Sand	70	78

SKETCH SHOWING LOCATION

Locate in reference to numbered state highways, street intersections, county roads, etc.



DRILLING FIRM Jenkins Pump Service DATE 4-30-80

ADDRESS 1988 Troutwood Rd SIGNED John P. Jenkins

** Additional space is needed to complete well log, use next consecutive numbered form.

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus, Ohio 43212

PLEASE USE PENCIL OR TYPEWRITER
DO NOT USE INK

T1
No. 33246

County Montgomery Township Mad River Section of Township 3

Owner Robert Wilson Address 2121 Troy St.

Location of property 2121 Troy St

CONSTRUCTION DETAILS

Casing diameter 5 7/8 Length of casing 60

Type of screen Length of screen

Type of pump

Capacity of pump

Depth of pump setting

Date of completion

BAILING OR PUMPING TEST

Pumping Rate 1/2 G.P.M. Duration of test 2 hr.

Drawdown 5 ft. Date June 9 96

Static level-depth to water 2 1/5

Quality (clear, cloudy, taste, odor)

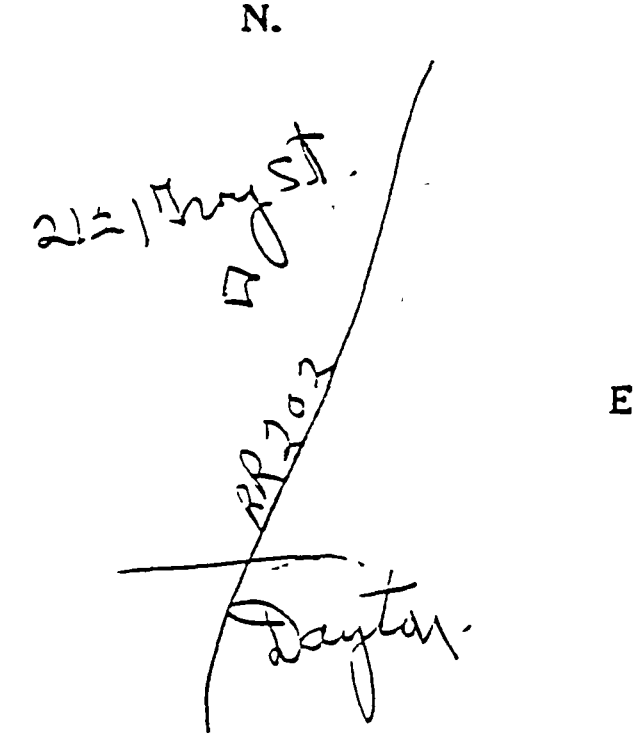
Pump installed by

WELL LOG*

Formations Sandstone, shale, limestone, gravel and clay	From	To
Clay	0 Feet	4 Ft.
sand & Sand	4	38
Clay	38	59
Gravel	59	60

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm CLAY P. GARRISON WELL CONTRACTOR

Address 3901 S. DIXIE DR. DAYTON 3, OHIO

Date June 10 1965

Signed Clay P Garrison

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus, Ohio

PLEASE USE PENCIL OR TYPEWRITER
DO NOT USE INK

No. 248078

County MONTGOMERY Township MADRIDER Section of Township 36

Owner MIKE HECK Address 2216 TROY ST DAYTO

Location of property

CONSTRUCTION DETAILS

Casing diameter 5 5/8 Length of casing 70

Type of screen Length of screen

Type of pump

Capacity of pump

Depth of pump setting

Date of completion

BAILING OR PUMPING TEST

Pumping rate 20 G.P.M. Duration of test h

Drawdown 5 ft. Date Dec 12-60

Developed capacity 1800

Static level—depth to water 35

Pump installed by

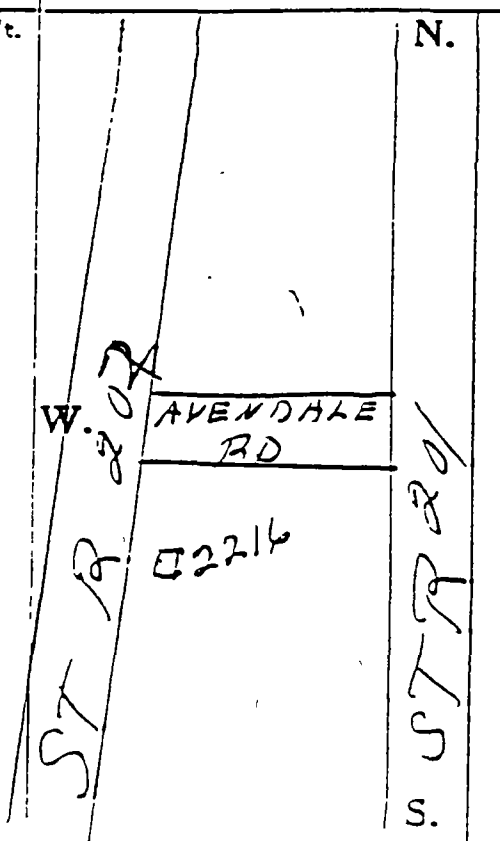
WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
CLAY	0 Feet	8 Ft.
BCLA & GRAVEL	8	32
BCLAY & SAND	32	54
B CLAY	54	65
GRAVEL	65	70

200 feet South of Avendale Rd on St R 202 East side

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc



See reverse side for instructions

Drilling Firm

Address

Date Dec. 12-60

Signed John Brenner

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus, Ohio

PLEASE USE PENCIL OR TYPEWRITER
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No. 248

County MONTGOMERY Township Mad River Section of Township 36

Owner A G BECHIC Address 3414 TROY ST

Location of property DAYTON OHIO

CONSTRUCTION DETAILS

Casing diameter 5 5/8 Length of casing 83
Type of screen — Length of screen
Type of pump Submersible
Capacity of pump 600
Depth of pump setting 70
Date of completion Mar 20-61

BAILING OR PUMPING TEST

Pumping rate 30 G.P.M. Duration of test
Drawdown 10 ft. Date Mar 20-61
Developed capacity
Static level—depth to water 30
Pump installed by JOHN BRENNER

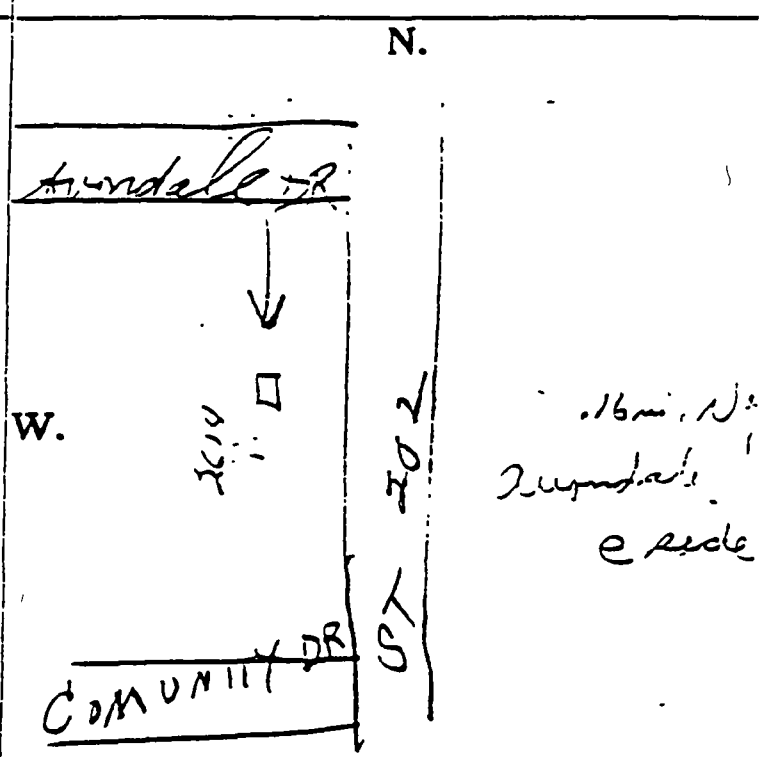
WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
CLAY	0 Feet	5 Ft.
GRAVEL	50	50
CLAY	50	59
SAND	59	80
GRAVEL	80	83

600 feet North of Brandale DR

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, et



See reverse side for instructions

Drilling Firm
Address

Date Mar 30- 61
Signed John H Brenner

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Columbus, Ohio

No 128409

County Monty Township Madison Section of Township or Lot Number 36

Owner Donald Takacs Address

Location of property 112 Avendale ave

CONSTRUCTION DETAILS	PUMPING TEST
Casing diameter 4 1/4" Length of casing 80'	Pumping rate G.P.M. Duration of test
Type of screen Length of screen	Drawdown ft. Date
Type of pump	Developed capacity
Capacity of pump	Static level—depth to water
Depth of pump setting	Pump installed by

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
Clay	0 Feet	7 Ft.
gravel and	7	35
clay	35	78
gravel	78	80

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, e

N.

W.

S.

See reverse side for instructions

Drilling Firm A E Lotts Son Date June 11/54

Address 213 Valley st Signed A E Lotts

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1500 Dublin Road
Columbus, Ohio

No. 218833

County [illegible] Township [illegible] Section of Township [illegible]

Owner [illegible] Address [illegible]

Location of property [illegible]

CONSTRUCTION DETAILS

Casing diameter 5" Length of casing [illegible]

Type of screen [illegible] Length of screen [illegible]

Type of pump [illegible]

Capacity of pump [illegible]

Depth of pump setting [illegible]

Date of completion [illegible]

BAILING OR PUMPING TEST

Pumping rate [illegible] G.P.M. Duration of test 1 hr

Drawdown [illegible] ft. Date [illegible]

Developed capacity [illegible]

Static level—depth to water [illegible] f

Pump installed by [illegible]

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
Top soil	0 Feet	10 Ft.
Gravel	54	55
Sand	55	65
Blue rock	65	90
Rock	90	

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

N.

W. E

S.

See reverse side for instructions

Drilling Firm [illegible] Date [illegible]

Address [illegible] Signed [illegible]

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus 12, Ohio

PLEASE USE PENCIL OR TYPEWRITER DO NOT USE INK

No 29738

County Montgomery Township Mad River Section of Township

Owner Michael Pandizk Address 120 Avondale Avenue, Dayton 14, Ohio

Location of property 120 Avondale Avenue, Dayton, Ohio

CONSTRUCTION DETAILS

Casing diameter 5-5/8" Length of casing 74

Type of screen RED BRASS Length of screen 4'

Type of pump ROBERTON 5 HP SUBMERSIBLE

Capacity of pump 650 GPH

Depth of pump setting 70 FT

Date of completion May 24, 1963

BAILING ~~OR PUMPING~~ TEST

Pumping Rate 20 G.P.M. Duration of test 1 hr

Drawdown 2 ft. Date 5/24/63

Static level-depth to water 43

Quality (clear, cloudy, taste, odor) HUGEY AMOUNT OF GAS WITH PUMPING

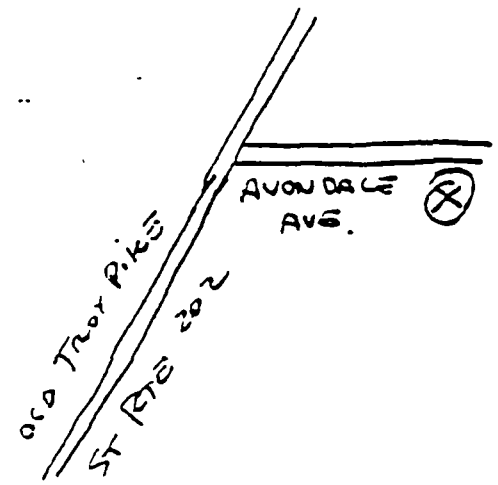
Pump installed by OWNER

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
clay	0 Feet	5 Ft.
dry gravel	5	50
lomey sand	50	70
sand-water	70	77

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm Moody's of Dayton, Inc.

Address P.O. Box 155, Vandalia, Ohio

Date May 27, 1963

Signed Donald R Moody

X = 531,600 (2000 x 2000)
Y = 653,300 -S

WELL LOG AND DRILLING REPORT

ORI

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Columbus, Ohio

No. 129065

County Montgomery Township Mad River Section of Township or Lot Number 31

Owner William H. Olson Address 110 Avondale Drive Dayton 1, Ohio

Location of property East Off Troy Pike about 1/8 of a Mile on Avondale Dr.

CONSTRUCTION DETAILS

Casing diameter 6" Length of casing 81 Ft.
Type of screen Length of screen
Type of pump
Capacity of pump
Depth of pump setting

PUMPING TEST

Pumping rate G.P.M. Duration of test
Drawdown ft. Date April 9, 1954
Developed capacity
Static level—depth to water 46
Pump installed by

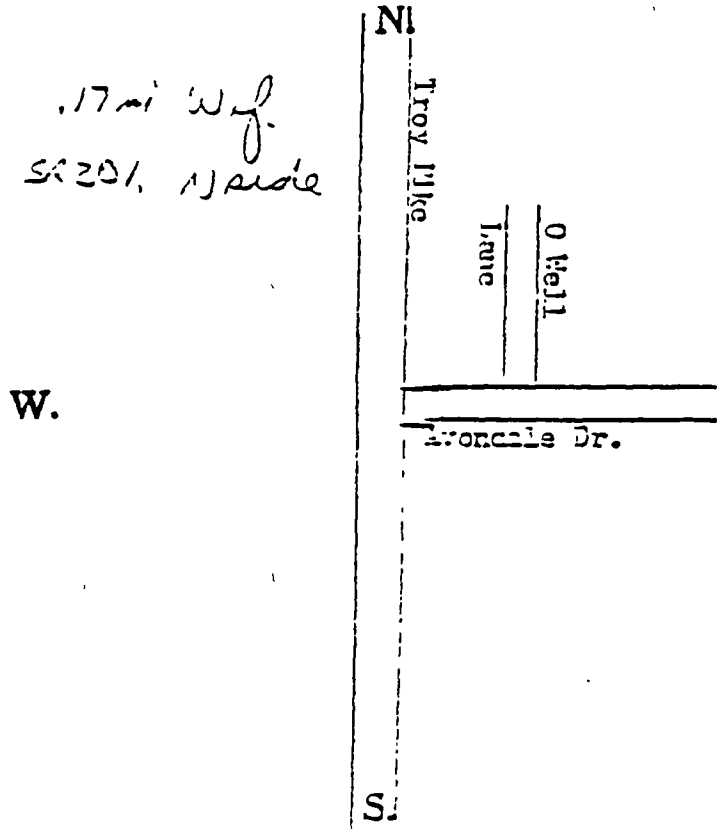
WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
Top Soil	0 Feet	5 Ft.
Gravel	5	35
Clay & Gravel	35	50
Gravel & Water	50	81

Dip Test at Approx. 10 G.P.M.

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, e



See reverse side for instructions

Drilling Firm EARL HOLLANDSWORTH Well Drilling
Address [redacted] Ohio Avenue - North Ridge DAYTON, OHIO
Date April 9, 1954
Signed Earl Hollandsworth

Dayton Thermal Products Division
Site Activity Summary

Prepared for:

Dayton Thermal Products Division

Acustar, Inc.

Dayton OH

Prepared by:

Clean Tech

2700 Capitol Trail

Newark DE 19711

April 1993

Table of Contents

Dayton Thermal Products Division
Site Activity Summary

1.0 INTRODUCTION

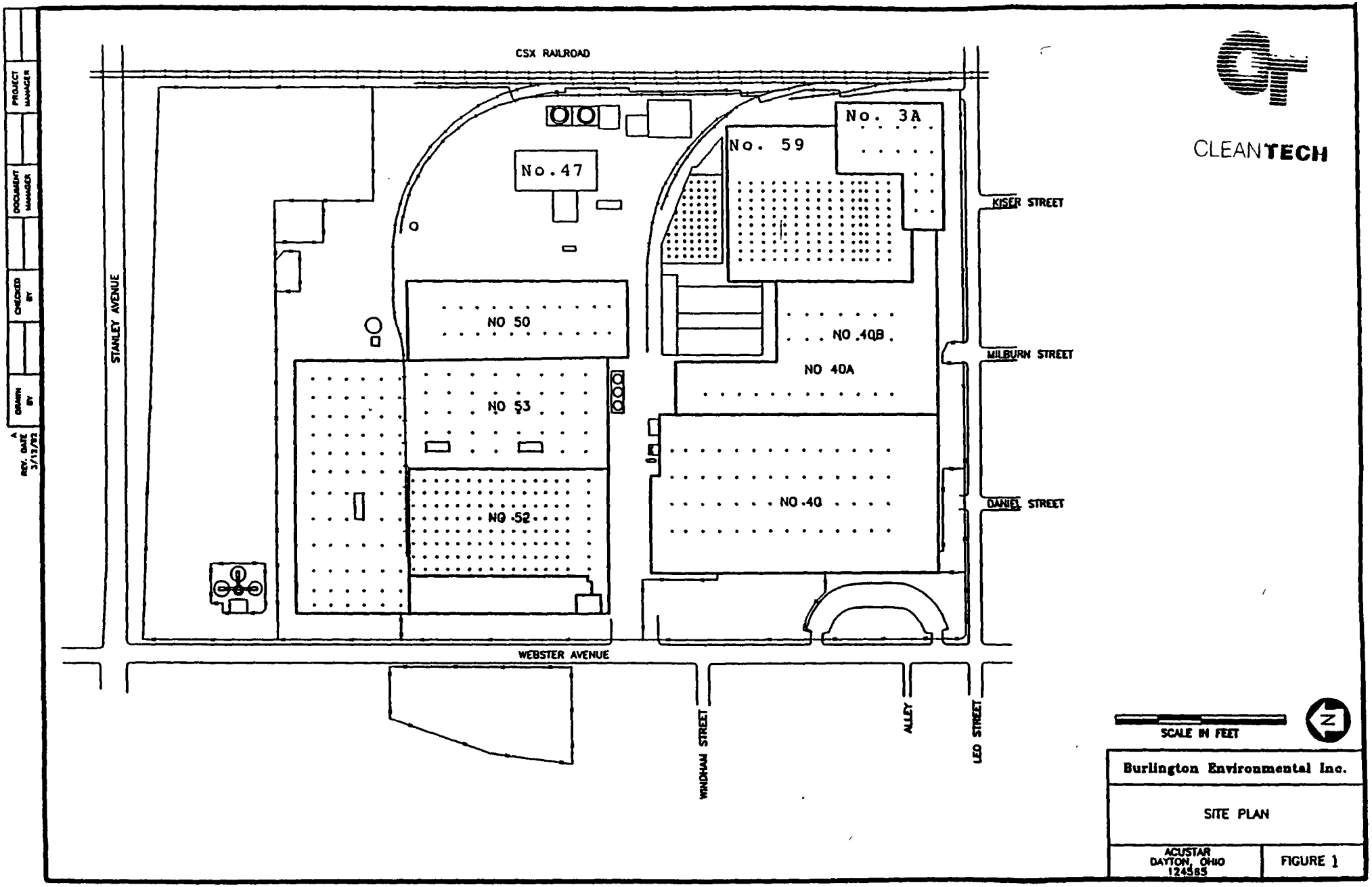
The Dayton Thermal Products Plant (the Plant) requested Clean Tech to prepare this summary report for their facility in Dayton, Ohio. This report focuses on the environmental activities which followed the discovery of VOCs and TPH in soils under the floor during demolition of the old Maxwell Complex. These buildings were replaced with a new manufacturing building. About five feet of clay soil was excavated in order to meet higher floor strength requirements for the new building. Also included are VOC remediation efforts on excavated soils to date, remediation plans to treat TPH remaining in the excavated soils, and future plans for a site-wide hydrogeological study.

This report is a compilation of information and data gathered from February 1991 through November 1992. A majority of this information was assembled by Mathes/Burlington, Columbia, Illinois.

1.1 Facility Description

The plant is located at 1600 Webster Street in Dayton, Ohio The facility contains over 1.3 million square feet and is located on approximately 60 acres A site plan is shown in Figure 1. Manufacturing began at the site in 1907 with the production of Maxwell cars. Past plant operations have included; manufacture of air conditioning equipment and furnaces, tubing production, plastic moldings and military paraphernalia. Chrysler purchased the facility in 1936 The plant primarily manufactures, assembles, and finishes heat exchangers and air conditioning components for motor vehicles

The facility is comprised of eight manufacturing buildings, a powerhouse, wastewater treatment plant, and incidental storage buildings Prior to its demolition, the antiquated Maxwell Complex was used as a warehouse for more than a decade Demolition began in October 1990 and the new Building #59 and parking lot were completed about one year later, in the fall of 1991 The latter now stands where the Maxwell Complex was formerly located (See Figure 1)


CSX RAILROAD
STANLEY AVENUE
No. 47
No. 59
No. 3A
KISER STREET
NO 50
NO 40B
NO 40A
MILBURN STREET
NO 53
NO 52
NO 40
DANIEL STREET
WEBSTER AVENUE
WINDHAM STREET
ALLEY
LEO STREET
SCALE IN FEET
N
CLEANTECH
PROJECT MANAGER
DOCUMENT MANAGER
CHECKED BY
DRAWN BY
A
REV. DATE 3/13/92
Burlington Environmental Inc.
SITE PLAN
ACUSTAR
DAYTON, OHIO
124585
FIGURE 1

1.2 Demolition of Maxwell Complex

Acustar completed an extensive environmental testing program during the demolition of the Maxwell Complex and prior to the construction of Building #59 The investigation included a review of existing reports and data and an evaluation of soil conditions.

Miami Geological Services, Inc., a small local firm, was initially retained to oversee construction activities and to provide for air and soil sampling during the demolition of the Maxwell complex. When the scope and complexity of environmental concerns increased during demolition, the Plant decided to hire the services of a larger company, Mathes/Burlington, to oversee the environmental concerns related to construction activities. The field activities performed were quite extensive and included the evaluation of:

- Soil conditions in and around existing structures which would be removed during construction. This included soils around such areas as sewer lines, pipelines, sumps, storage pads and storage areas, etc.,
- Soil conditions in areas to be excavated. This included the foundation areas, the column piers, and adjacent paved surfaces ,
- Soils remaining in-place in selected areas such as the clay soil used as part of the foundation material,
- Soil stockpiled on-site for disposal or remediation; and
- Slabs of concrete from the demolition of the foundation of the Maxwell complex

The investigation of the soils from the Maxwell Complex included:

- Test boreholes in areas which were excavated for strip foundations;
- Test boreholes in areas which were excavated for column piers;
- Soil sample testing after excavation of sewer lines, sumps, catch basins, and oil/water separators

Twenty (20) soil samples were collected from the area which was excavated for the strip foundation. These twenty soil samples were composited into five samples. These samples were analyzed for Toxicity Characteristic Leaching Procedures (TCLP) test for metals, volatiles, semi-volatiles, and polychlorinated biphenyls (PCBs)

Fifty-six (56) boreholes were drilled in the areas to be excavated for the column piers. These boreholes were four to six feet in depth. These samples were analyzed for total metals (chromium, lead, and zinc), volatile organic compounds (VOCs), and total petroleum hydrocarbons (TPH). A composite sample from each borehole was analyzed for these parameters.

Additional samples were taken from areas which were excavated for sewer lines, sumps, catch basins, and oil/water separators. The analytical results from soil samples taken within the foundation area indicated above detection levels for certain VOCs and TPH. The volatiles which were detected include; trichloroethene (TCE), tetrachloroethane (PCE), 1,1,1-trichloroethane (TCA), 1,1-dichloroethene (DCE), and 1,2-dichloroethene. Attempts were made to correlate the regulated compounds with a process or source. No correlations or sources of these materials could be found.

1.3 Soil Stockpile Construction

As a result of the soil investigation and subsequent excavation of soils, different soil stockpiles were constructed. The stockpiles were created according to the primary compound identified during analysis. Stockpiles soils were segregated to facilitate potential future remediation. The data collected as part of an environmental assessment indicated that the four stockpiles should be constructed as follows.

- Stockpile 1, the "Clean" Pile
  Soil in this pile, the second largest, appeared to be relatively clean and free of visible stains. Field measurements indicated little or no VOCs. The soil volume is approximately 7,100 cubic yards Analytical data indicated this stockpile contained less than 40 mg/kg TPH and less than 50 ug/kg VOCs. It is located several hundred feet north of Building #47

- Stockpile 2, the "TPH" Pile
  This, the largest stockpile, was visibly stained and primarily contained TPH ranging from 40 to 3,500 mg/kg. Its volume is approximately 10,800 cubic yards. The pile is located on the northeast corner of Building #47

- Stockpile 3, the "VOC" Pile
  This stockpile was visibly free of stains but contained higher levels of VOCs. Analysis indicated VOC levels up to 10,000 ug/kg. Its volume is approximately 2,800 cubic yards. It is located on the northwest corner of Building #47.

- Stockpile 4, the Fourth Pile
  Construction of this, the smallest pile, was not completed until some time after the above three stockpiles. The pile was first analyzed for VOC and TPH by Clean Tech in November 1992. It was found to contain TPH greater than 105 mg/kg. It is basically comprised of soils excavated from the new building's parking lot which was completed after the new building. Its volume is approximately 1,800 cubic yards. This pile is just east of Building #47

2.0 REMEDIATION BY VAPOR EXTRACTION

Because of the presence of varying levels of VOCs and TPH in the footprint soils, remediation of these soils was anticipated and various methods were studied prior to excavation. It had been determined that the soils were non-hazardous. This was concluded because (1) after diligent efforts, the VOCs could not be traced to a known source, and (2) the soils were tested for characterization (TCLP analysis) and found to be non-hazardous.

Mathes proposed and the Plant agreed to install aboveground vapor extraction systems for the Clean, TPH, and VOC stockpiles. This appeared to be the most cost-effective approach to remediate the soils for VOCs. Preparations were made to accommodate the soon-to-arrive soils. Polyethylene sheeting was also placed over each pile when it was completed.

For the three stockpiles, the Clean, TPH, and VOC, a series of four inch perforated pipes were appropriately spaced and installed the entire length of the stockpiles. These pipes were covered with geotextile.

Because of the low VOC levels in the Clean stockpile, this pile was allowed to aspirate naturally without blowers.

For the TPH and VOC stockpiles, however, the vent pipes were tied into a manifold system which, in turn, was connected to regenerative blowers to extract the VOCs Sampling ports were installed after the blowers to monitor the exhaust gases Preparations for vapor extraction of the stockpiles were completed on April 19, 1991 Before start-up, however, a pilot study was conducted to optimize operating parameters and gather information on VOC emissions for Agency submittal. On April 30, 1991, RAPCA granted approval to operate the system on a full-time basis. Throughout the vapor extraction treatment period, VOC emissions were monitored. As anticipated, VOC concentrations decreased substantially with time When the point of diminishing returns was finally reached and negligible amounts of VOCs were detected in the exhaust stream, the stockpiles were then sampled and analyzed.

3.0 SOIL SAMPLING & ANALYTICAL RESULTS

3.1 Sampling & Analytical Procedures

During the week of July 29, 1991, after three months of vapor extraction, the stockpiles were sampled and analyzed to evaluate the effectiveness of the remediation program. U.S. EPA Guidelines were followed to determine a suitable grid pattern for sampling. The following grid intervals were selected:

Stockpile	Sampling Grid Interval (feet)
Clean	41
TPH	39
VOC	32

The samples were collected using standard split-spoon procedures, followed by hollow-stem augering. All material was screened with an HNU meter and composited for analysis. All three stockpiles were analyzed for VOCs using Method 8240 The TPH stockpile was also analyzed using Method 418.1.

3.2 Clean Stockpile

A total of 15 samples were analyzed from this stockpile. Individual VOCs were all less than 100 ug/kg. The VOCs detected were trichloroethene (TCE), 1,1,1-trichloroethane (TCA), tetrachloroethene (PCE), ethyl benzene, xylene, and chloroform

- No VOCs were detected in five of fifteen samples;
- In six other samples, only TCE, from 8 3 ug/kg to 54 ug/kg, was detected;
- In one sample, 64 ug/kg TCE and 12 ug/kg TCA were detected, and
- In the last three samples, TCE (49, 52, and 46 ug/kg, respectively), TCA (14, 9 8, and 96 ug/kg, respectively), and PCE (13, 21, and 9 8 ug/kg, respectively) were detected

3.3 TPH Stockpile

A total of 15 samples were analyzed from this stockpile. The samples were analyzed for VOCs and TPH. The VOCs detected include: TCE, TCA, PCE, and chloroform. All samples, except one, were below 100 ug/kg. One sample contained 130 ug/kg of TCE. The TPH results, however, showed that the TPH stockpile still contained concentrations in excess of the Ohio EPA's limit of 105 mg/kg. Concentrations ranged from 17 5 mg/kg to 6,170 mg/kg in this pile.

- No VOCs were detected in three samples;
- Only TCE, ranging in concentration from 8.6 ug/kg to 30 ug/kg, was detected in seven samples;
- TCE (130 and 71 ug/kg, respectively) and TCA (6.9 and 8 1 ug/kg, respectively) were detected in two samples;
- TCE (86 ug/kg) and chloroform (6.1 ug/kg) were detected in one sample;
- TCE (71 ug/kg), TCA (8 ug/kg), and chloroform (8 9 ug/kg) were detected in one sample;
- TCE (67 ug/kg), PCE (16 ug/kg), and chloroform (9 4 ug/kg) were detected in one sample.

3.4 VOC Stockpile

18 samples were analyzed for VOCs from this stockpile. All VOCs in this pile were below 100 ug/kg. The VOCs detected included; TCE, TCA, PCE, ethyl benzene, xylenes, and chloroform.

- No VOCs were detected in seven samples;
- TCE ranging in concentration from 4.34 ug/kg to 41 ug/kg, was detected in five samples;
- PCE (9 ug/kg) was detected in one sample;

- TCE (24 ug/kg), TCA (6 ug/kg), ethylbenzene (6.2 ug/kg), xylenes (38 ug/kg), and chloroform (12 ug/kg) were detected in one sample;
- TCE (4.3 ug/kg), ethylbenzene (2 ug/kg), and xylenes (94 ug/kg) were detected in one sample;
- TCE (54 ug/kg), TCA (17 ug/kg), and PCE (10 ug/kg) were detected in one sample;
- TCE (32 ug/kg) and PCE (9 ug/kg) were detected in one sample; and
- TCA (13 ug/kg) and PCE (7.8 ug/kg) were detected in one sample.

4.0 EFFECTIVENESS OF VAPOR EXTRACTION

Efforts were made to calculate the percentage of VOCs removed from each pile following vapor extraction. This calculation was based on the VOC concentrations in the soils compared to emitted mass from the regenerative blowers. This was intended as a general indication of the effectiveness of the treatment.

Based on the above described calculation, it was estimated that between 83 to 100% of the VOCs were extracted from the three stockpiles. Based on the average, about 90% of all VOCs were removed.

The Ohio EPA policy on "How Clean is Clean?" states that the cumulative risk posed by clean soil should not exceed 1×10^6 excess cancer risk level. Based on the analyses of the three stockpiles, all the regulated components were below this threshold level.

Based on Clean Tech's study of the TPH and fourth stockpiles, it appears these two piles still exceed 105 mg/kg of TPH. The Plant intends to bioremediate these soils and retain them on-site. Clean Tech, therefore, also conducted a biotreatability study to determine if the two stockpiles could be biologically treated.

5.0 BIOTREATABILITY STUDY

5.1 Background

The purpose of this study was to determine if organisms indigenous to the site and cultured in the lab on specific organic compounds, were capable of degrading the TPH compounds at the Dayton facility. The lab scale study would evaluate the effectiveness of biological treatment of the TPH stockpile and the previously untested fourth stockpile.

On November 6, 1992 composite soil samples were taken from the TPH and the fourth stockpiles by Clean Tech. The first set of six samples was taken from the stockpile designated the TPH stockpile. These samples were composites which were taken at various locations on the side slopes and top of the pile.

The second set of six samples was taken from the pile designated as the fourth pile. A total of six composite samples were taken from the top and at various locations at the side slopes of this pile by Clean Tech.

5.2 Results

The soil samples, upon arrival at Clean Tech, were logged in accordance with standard QA/QC procedures. The following parameters were measured for each soil pile sample: pH, nitrate-nitrogen, phosphorous, humus (organic content), ammonia-nitrogen, nitrite nitrogen, and soil moisture. Analysis indicated that nitrogen was lacking in all forms in the soil samples. Analysis also indicated that the soils were lacking in organic matter and were slightly basic.

The feasibility study indicated that the lack of nutrients in the soils was one of the limiting factors for biological treatment at the Dayton site. Microbial respiration, as determined by measuring CO_2 evolution, confirmed that the growth of the indigenous microbial community under ambient conditions was occurring but at a very slow rate. This indicated that even though hydrocarbon degrading microbes were present, the present environmental conditions did not allow the existing microbes to function effectively.

Degradation of hydrocarbons by enhanced biological methods is dependent on a number of factors. The most important factors include:

- The existence of indigenous microbes capable of degrading the compounds of concern;
- Hydrocarbon type and concentration;
- Soil type and structure;
- Nutrient availability;
- Moisture content;
- Oxygen availability (Aerobic processes).

The first factor was analyzed for this site. Fertile soils usually contain 10^7 to 10^9 microbes per gram of dry soil of which 10^5 to 10^6 are hydrocarbon degraders (prior to the addition of hydrocarbons). After hydrocarbons have been added, hydrocarbon degraders typically increase to 10^6 to 10^8 microbes per gram of dry soil.

The composite soil sample was analyzed by standard plate count which is a direct quantitative measurement for aerobes and facultative anaerobes. The resultant count was 4 0 x 10^7 microbes per gram of dry soil This indicated that there is an indigenous microbial population at the site which has been impacted by site conditions. If environmental conditions were suitable, the plate count should have been an order of magnitude greater.

In order to approximate total TPH levels in the soil composite sample, Clean Tech utilized EPA Method 418.1. The initial soil composite contained an approximate TPH level of 113 milligrams per kilogram (mg/kg). At the end of the study, the reactor vessel which contained the appropriate nutrient levels, contained no detectable concentration of TPH This result was compared to the live control which still contained approximately 113 milligrams per kilogram (mg/kg) of TPH. The dead control also had a similar TPH value. This conclusively showed that the bacteria had successfully degraded the contaminants of concern as evidenced by the lack of contaminants in the reactor vessel that contained the necessary nutrients.

The third factor affecting bioremediation is soil type. This affects the ability of the soil to transmit air, water, and nutrients. More permeable soils allow rapid mobility of nutrients The soil analyzed in this study contained some silt and clay which would somewhat restrict permeability

Nutrients and the bioavailability of nutrients is another critical factor Nitrogen and phosphorous were the most critical nutrients lacking in the test soils. The nutrients added in the study were rapidly depleted. Another key factor which had affected nutrient availability is adsorption. Clay soils have a high retention capacity for nutrients. The initial addition of nutrients to the soils may have been tightly bound to the soil thereby allowing only minimal amounts to be available for microbial growth. Subsequent additions of nutrients to the soils showed a rapid uptake of nutrients as measured by increased CO_2 production.

Other factors which are important but which were not a limiting factor in this study include temperature and moisture availability. Temperature was kept stable at ambient conditions throughout the study at approximately 20°C. Moisture availability was also adequate. The initial samples had moisture contents above 10%, which is the level at which bioactivity becomes marginal.

The last critical factor in this study is oxygen availability. Oxygen availability controls the rate at which aerobic organisms can function. One liter of air contains 20% oxygen or 256 mg of oxygen. Bioactivity in unsaturated soils is much faster than in saturated soils since an adequate air supply can be provided. All samples were aerated at normal atmosphere concentrations. Enhanced biodegradation will need additional dissolved oxygen.

5.3 Conclusions

The study concluded that biological activity was occurring at minimal rates due to restrictive site factors. Nutrient concentrations must be maintained to sustain biological activity due to the retention of nutrients by the soils. The study did confirm that the soils on the site were amenable to bioremediation.

6.0 BIOREMEDIATION OF THE TPH & FOURTH STOCKPILES

The biotreatability study established that the regulated compounds could be degraded to below detection limits by microorganisms. Clean Tech proposes to design and operate a land treatment unit to remediate the soil.

The general remediation concept involves moving the soil from the stockpiles and placing the soil in the treatment unit. The treatment unit will consist of 24 inch lifts of soils which will be placed on a liner. The lifts will be interspersed with four-inch PVC piping. The piping will be manifolded back to a biological reactor.

Biotreatability Study
for the
Acustar Plant
Dayton Thermal Products
Dayton, Ohio

November 1992

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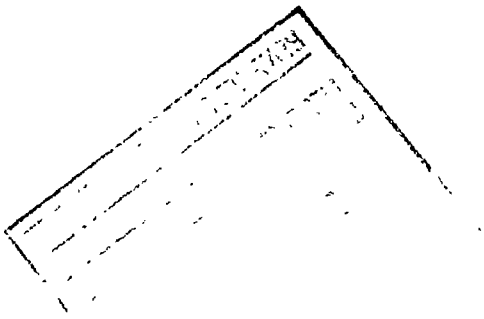

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Figures

1.0 INTRODUCTION

Clean Tech routinely employs a two (2) level approach to determine the feasibility of enhanced biodegradation in the remediation of contaminated soils and groundwater There are two (2) major criteria which must be met in order to consider biological remediation of the site. The criteria are:

- There must exist within the study site, homogeneous or heterogeneous populations of bacteria capable of using the contaminants of concern as a growth substrate; and
- Alterations of the physical and/or chemical environment must be demonstrated to result in the enhancement of microbial community activity

Failure to meet either of these two criteria indicates that biological approaches to remediation of the site will be difficult to implement In addition, it must also be noted that meeting the above criteria does not necessarily confirm that bioremediation is the best possible treatment option Feasibility studies must be followed by pilot studies in the field and then with field monitoring during the remediation process

The purpose of this study was to determine if organisms indigenous to the site and cultured in the lab on specific organic compounds, are capable of degrading the contaminants of concern

1.1 Background

The Acustar Plant is located at 1600 Webster Street in Dayton, Ohio The soil piles from which samples were obtained are delineated in Figure 1

On November 6, 1992 several composite soil samples were taken from the two soil piles contained on-site The first set of six (6) samples were taken from the pile designated the "Total Petroleum Hydrocarbons (TPH) Pile" These samples were composites which were taken at the top of the pile and at various locations on the side slopes of the pile

The second set of six (6) samples were taken from the pile designated as the "Unknown Pile" A total of six (6) composite samples were taken from the top and at various locations at the side slopes of this pile

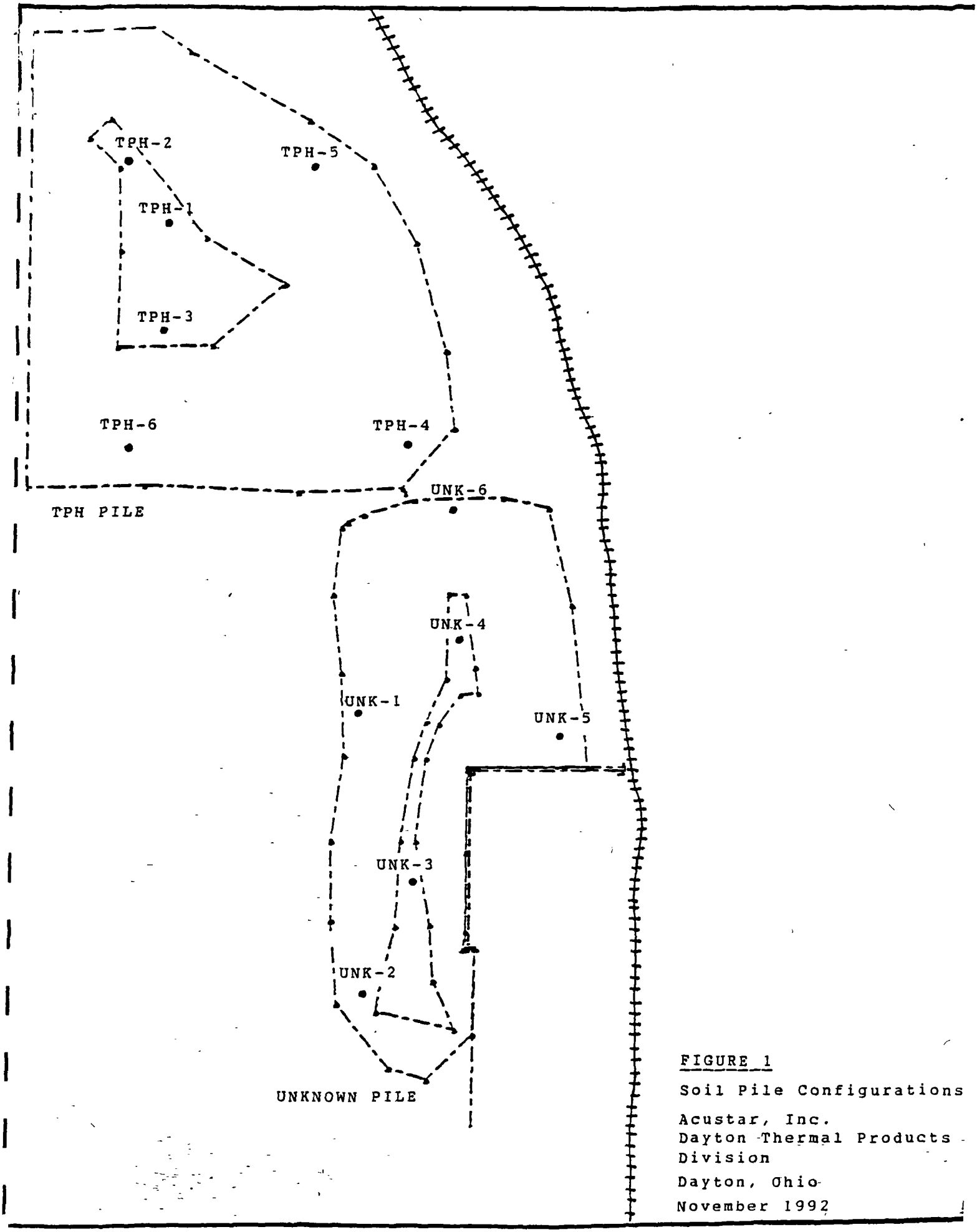


FIGURE 1

Soil Pile Configurations

Acustar, Inc.
Dayton Thermal Products Division
Dayton, Ohio
November 1992

1.2 Field Sampling

Composite samples were collected from several locations as discussed in the previous sections from the two soil piles A total of twelve (12) soil samples were taken at the Dayton plant The following is a brief description of each sample location and its characteristics

TPH Pile

Sample #1 (TPH-1) was taken at the top of the TPH pile This sample was composited between 4 and 5 feet The soil was silt/clay and contained fill material There was no petroleum hydrocarbon odor present.

Sample #2 (TPH-2) was taken at the top of the TPH pile This sample was composited between 3 and 4 feet The soil was silt/clay and contained fill material

Sample #3 (TPH-3) was taken at the top of the TPH pile The sample was composited between 4 and 5 feet There was a slight petroleum hydrocarbon odor present The soil from this boring was silt/clay and contained fill material

Sample #4 (TPH-4) was taken from the side of the TPH pile, adjacent to the railroad tracks This sample was composited between 3 and 4 feet The soil in this boring was a moist silt/clay mixture No petroleum hydrocarbon odor was present

Sample #5 (TPH-5) was taken from the side of the TPH pile, approximately 300 feet from Sample #4 Initially there was a petroleum hydrocarbon odor present The sample was composited between 4 and 5 feet The soil was a silt/clay mixture

Sample #6 (TPH-6) was taken from the side of the TPH pile, near the vacuum extraction pumps The sample was composited between 3 and 4 feet There was no petroleum hydrocarbon odor present The soil was a silt/clay mixture

Unknown Pile

Sample #1 (UNK-1) was taken from the side of the unknown pile, near the storage building The sample was composited between 3 and 4 feet There were no odors present The soil consisted of a silt/fill mixture

Sample #2 (UNK-2) was taken at the rear of the pile There was a strong petroleum hydrocarbon odor present The soil from this boring consisted of a silt/sand mixture.

Sample #3 (UNK-3) was taken at the top of the pile, near the waste water treatment plant There was no petroleum hydrocarbon odor present. The soil was silt/sand and contained fill material

Sample #4 (UNK-4) was taken at the highest point of the pile. The soil was a silt/clay mixture The soil was composited between 3 and 4 feet No petroleum hydrocarbon odor was present

Sample #5 (UNK-5) was taken from the side of the pile, near the railroad tracks The soil was silt/sand and contained fill material No petroleum hydrocarbon odor was detected The sample was composited between 4 and 5 feet

Sample #6 (UNK-6) was taken from the front of the pile, across from the TPH pile The sample was composited between 4 and 5 feet The soil was a silt/clay mixture. There was no petroleum hydrocarbon odor present

2.0 STUDY PROCEDURES

The soil samples, upon arrival at **Clean Tech**, were logged in accordance with standard QA/QC procedures The following parameters were measured for each soil sample: pH, nitrate-nitrogen, phosphorous, humus (organic content), ammonia-nitrogen, nitrite-nitrogen and soil moisture The samples were then refrigerated at 4°C The results of the soil samples which were analyzed are shown in Table 1

TABLE 1
SOIL CHEMICAL CHARACTERISTICS - INITIAL SAMPLES - ACUSTAR

Sample No.	pH	Nitrate	Phosphorous	Ammonia Nitrogen	Nitrite	Organic Content	Moisture %
TPH 1	8 2	<5 ppm	100 ppm	ND	ND	ND	19 65
TPH 2	8 1	<5 ppm	75 ppm	ND	ND	ND	17 87
TPH 3	8 2	<5 ppm	100 ppm	ND	ND	ND	20 2
TPH 4	8 5	<5 ppm	75 ppm	ND	ND	ND	9 8
TPH 5	8.4	<5 ppm	100 ppm	ND	ND	ND	2 11
TPH 6	8 1	<5 ppm	100 ppm	ND	ND	ND	7 34
Unknown 1	8 3	<5 ppm	75 ppm	ND	ND	ND	7 38
Unknown 2	8 2	10 ppm	100 ppm	ND	ND	ND	6 01
Unknown 3	8 6	<5 ppm	75 ppm	ND	ND	ND	8 24
Unknown 4	8 3	<5 ppm	75 ppm	ND	ND	ND	9.75
Unknown 5	8 4	<5 ppm	100 ppm	ND	ND	ND	8 47
Unknown 6	8 2	<5 ppm	75 ppm	ND	ND	ND	6 43
TPH Average*	8 25	<5 ppm	91 67 ppm	ND	ND	ND	12 8
UNK Average*	8 3	<5 ppm	83 3 ppm	ND	ND	ND	7 7
Composite*	8 2	<5 ppm	75 ppm	ND	ND	ND	11 54

Note
Average - The arithmetic average of the samples taken from the Dayton Plant
Composite - The chemical characteristics of the sample used for the biotreatability study which was a composite from each of the twelve samples
ND = Not Detected (<1 ppm)

To initiate the study, a total of 1,200 grams were taken from the twelve soil samples to create a composite sample for the treatability study Fifty (50) grams of this composite sample were analyzed for initial TPH content (see Table 2)

TABLE 2
BIOMETER FLASK COMPOSITIONS

Sample	TPH (ppm)	MDL
TPH 1	ND	5 ppm
TPH 2	283 5	---
TPH 3	ND	5 ppm
TPH 4	170 1	---
TPH 5	113.4	---
TPH 6	56.7	---
Unknown 1	113.4	---
Unknown 2	170 1	---
Unknown 3	ND	5 ppm
Unknown 4	113 4	---
Unknown 5	170 1	---
Unknown 6	170 1	---
Average	113 4	---
Composite	113 4	---

Next, approximately fifty (50) grams of the composite sample were placed into each reactor vessel The reactor vessels were allowed to stabilize and become acclimated for a period of two (2) days before their physical and chemical environments were altered This permitted the determination of background respiration rates for each reactor vessel or what is known as the "lag phase" of bacterial growth

Before the amendments were added, respiration rates during the lag phase were measured to ensure that the flasks which were amended were below or equal to the respiration rates measured in the two (2) control flasks A total of five treatment variations were completed for the study The reactor vessels were amended in the following manner.

TABLE 3
BIOMETER FLASK COMPOSITIONS

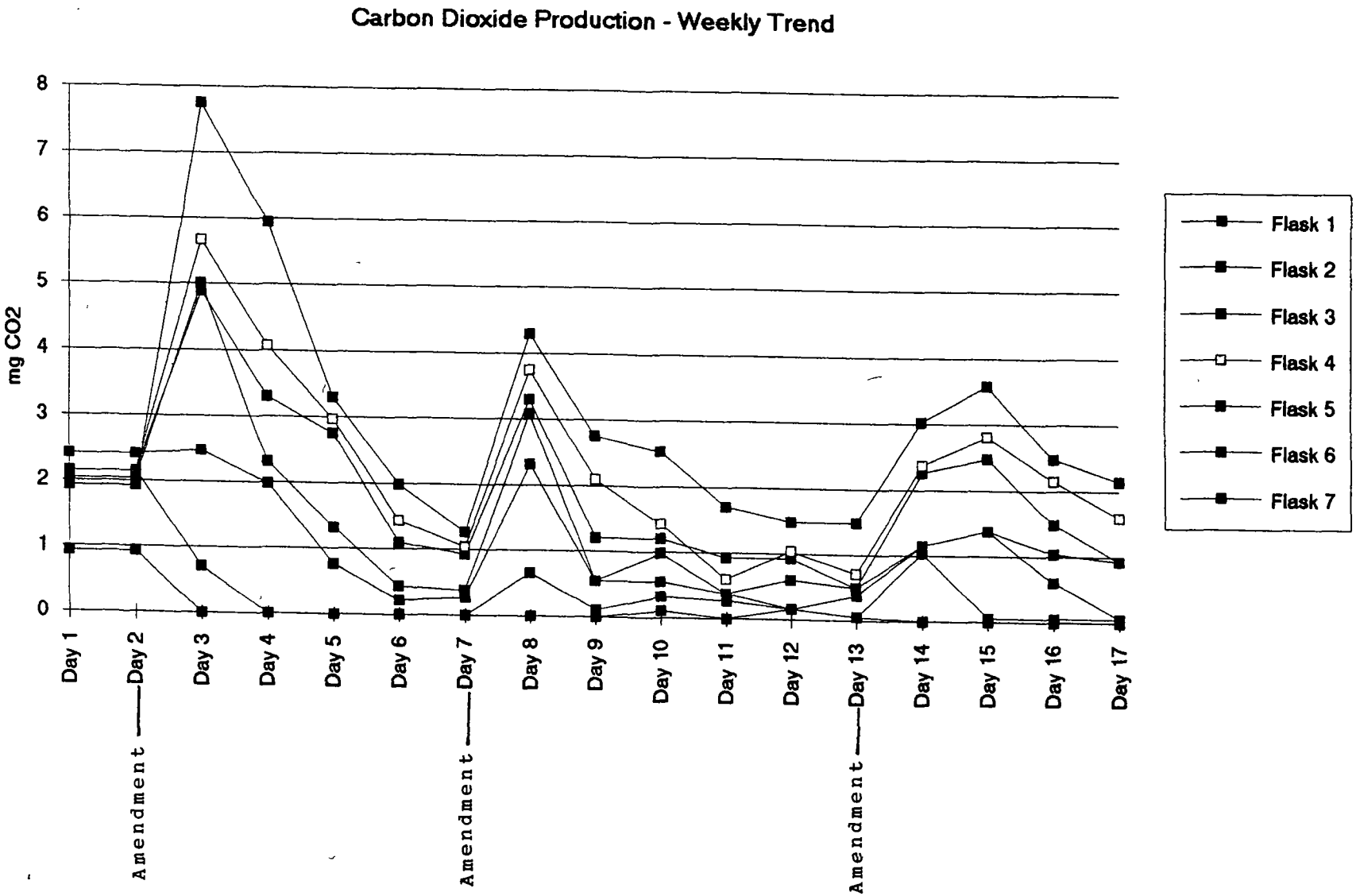
Reactor Vessel	Nutrient Percentages (Nitrogen:Phosphorous)
1	2%
2	4%
3	5%
4	6%
5	8%
6	No amendments (Live Control)
7	No amendments (Sodium Azide-Killed Control)

(Note Nutrients. N P = 10 15 ratio)

Reactor vessels 6 and 7 served as controls Vessel 6 contained a composite sample of background soils which were not chemically treated This vessel provided background respiration rates for indigenous bacteria whose environment was not amended Vessel 7 contained a composite soil sample in which the microbes present were destroyed chemically with sodium azide (1% v/w final concentration) All reactor vessels were monitored daily for CO_2 production levels

The treatability study was conducted over a seventeen day (24 hour intervals) period Additional nutrients were added in 5 mL aliquots on days seven and thirteen of the study Additional nutritional amendments were added on days seven and thirteen because respiration rates began to decrease at that time In addition, it was believed that the nutrients may have adsorbed onto the soil and were not available for bacterial growth. It was anticipated that adsorption might dominate the response during the first half of the study before nutrients reached equilibrium since the soils were low in nutrients The addition of the second aliquots of nutrients was necessary in order to determine if additional microbial activity could be stimulated with the addition of nutritional supplements (see Figure 2) All other study conditions remained unaltered

Figure 2
Acustar - Dayton, Ohio



3.0 GENERAL DISCUSSION

Bench scale studies are conducted to gather baseline information on such process limiting factors as oxygen, moisture requirements, and the need for nutritional supplements In this section we will further discuss these factors

3.1 Nutrient Requirements

Microorganisms require the nutrients nitrogen and phosphorous to grow as well as other micronutrients However, these materials are either available in insufficient quantities or are completely lacking in the environment. Therefore, it often becomes necessary to add supplemental nitrogen and phosphorous to the environment to enhance biodegradation

The key to accelerating the natural degradation process is to maintain a sufficiently high threshold concentration level of the nutrients nitrogen and phosphorous Sufficient amounts of nitrogen and phosphorous must be available to balance the available carbon The available carbon for this site is the hydrocarbon contaminant The threshold concentration level is a function of several factors Two of the most significant factors are the degree of microbial utilization, and the amount of adsorption of the nutrients onto the soil

The ideal metabolic ratio of Carbon to Nitrogen is 10 1 and Carbon to Phosphorous, 20 1 For the majority of hydrocarbons, it can be assumed that all of the contaminant becomes a carbon source for the microbes One can then estimate the amount of nitrogen and phosphorous required for remediation However, soil retention of nutrients is a key factor which must also be assessed Retention of nutrients can be quite high, ranging from 10's to 100's of ppm It is this retention factor that is often the deciding factor of the nutritional needs of the microbes which are necessary for bioremediation.

At the Acustar site, nitrogen was lacking in most of the soil samples The tests also indicated that there was minimal humus or organic matter present Organic content aids in supplying nutrients (nitrogen and phosphorous) and increases the nutrient retention capacity of the soil This lack of organic matter may explain why there was a minimal amount of nitrogen in the initial samples (see Table 1)

3.2 O_2 Requirements

In general, the aerobic biodegradation process is a more efficient and rapid metabolic pathway than the anaerobic process With oxygen, however, the supply/demand situation is quite different from that of nutrients Considerably more oxygen than nitrogen or phosphorous is required for biodegradation since each kilogram of hydrocarbon that is metabolized requires approximately 3 4 kilograms of oxygen to convert it to carbon dioxide and water

Reaction	(CH_2)	+	1 5 O_2	→	CO_2 +	H_2O
Weights:	14 kg		48 kg		55 kg	18 kg

In unsaturated or shallow soils, the oxygen supply can be severely limited within inches of the surface. This problem is readily corrected by tilling the soil Tilling the soil provides the oxygen essential for enhanced bioremediation

In saturated or deep soils, supplying oxygen to the microorganisms is far more difficult An effective way of supplying oxygen to a saturated or deep system is to use a chemical source, such as hydrogen peroxide

An advantage to using hydrogen peroxide as an oxygen source is that it readily dissolves in water However, hydrogen peroxide is also a biocide Thus, it must be added at levels that are not toxic to microbes but which are still capable of maintaining a high oxygen content

At the Acustar Plant, a significant percentage of the soil piles were fill, consisting of clay and silt This fill has been compacted, thus allowing little oxygen to diffuse beneath the surface of the soil Biological activity has been severely limited because of this and the treatment system will need to be designed to increase oxygen to the soils

3.3 Moisture

Moisture is very important to the success of in-situ bioremediation In general, there are two (2) extremes which must be avoided Soil moisture conditions should be maintained between 15 and 25% and pooling and/or flooding of water should be avoided (standing water causes denitrification) Extremely dry conditions (less than 10%) should also be avoided

The soils taken from the site have soil moistures between 2 11% and 20 2% These conditions must be accommodated in the design.

3.4 Soil pH

Soil pH should be kept in the neutral to alkaline range The aerobic breakdown of organic molecules sometimes results in the accumulation of organic acid intermediates which reduces the pH and may subsequently inhibit biological activity This effect can easily be corrected through the addition of chemicals to adjust the pH to be more alkaline with additives such as lime.

The soils found at Dayton are slightly alkaline However, the bacterial reduction of contaminants will reduce the pH All reactor vessels were adjusted to a neutral pH of 7 for the duration of the study

3.5 Nitrogen

Reduction of contaminants may occur with the use of nitrate (NO_3) as a terminal electron acceptor (denitrification). This involves the reduction of NO_3 to N_2 This reduction occurs in the following sequence $NO_3^- \rightarrow NO_2^- \rightarrow N_2$ During aerobic denitrification, NO_3 serves as the terminal electron acceptor so that oxygen is available for reduction of the organic contaminant

The enzymes necessary to complete denitrification are only formed under anaerobic conditions or conditions of low oxygen tension In most cases nitrate is required as the inducer Also, the activity of the enzymes involved in nitrate reduction to N_2 are strongly inhibited by O_2 Thus, denitrification can only take place when O_2 is absent or only available in insignificant quantities

If denitrification is to occur, there must be significant quantities of nitrogen available for the bacteria to grow It becomes extremely important to develop a high organic content in the soil Unlike most nutrients, nitrate migrates with percolating water, making it difficult to provide adequate storage quantities in the soil Nitrogen, however, is fixed in the soil in a stable form Denitrification is not the preferred biological activity at the Acustar site

4.0 STUDY DISCUSSION

4.1 Soil Chemical Characteristics

The study results were reviewed to determine if the two criteria were met in order for bioremediation to be effective at the site. The first criteria was to determine if there was an indigenous population of bacteria capable of using the contaminants of concern as a growth substitute The second criteria that must be met is that the changes to the environment must result in an increase in microbial growth as measured by carbon dioxide production levels.

The soils were analyzed for pH, nitrogen content, organic matter, moisture and phosphorous. The chemical characteristics of the samples before physical/chemical alterations are contained in Table 1 The results indicate that nitrogen was lacking in all forms in the soil samples One possible explanation for the lack of nitrogen is that the soils were depleted of nutrients due to microbial activity which is occurring at the site although at minimal levels. Over time this activity results in the depletion of nutrients in the soil

The soils were also found lacking in organic matter The organic content of soils is important for bioremediation to be effective for several reasons. Organic matter aids in moisture retention, it supplies various nutrients and it increases the nutrient retention capacity of the soil The lack of organic matter in these soils may partially explain the lack of nutrients in the soil samples Organic matter also enhances soil aeration, making the soils aerobic instead of anaerobic. An average soil contains 3-5% organic matter All the samples analyzed contained no detectable amounts of organic matter.

The soils in the initial composite were also slightly basic As the microbes degrade contaminants of concern, the pH of the soils is reduced At the conclusion of this treatability study, through nutrient addition, nitrate, nitrite, phosphorous, and ammonia levels had increased slightly and pH had been chemically adjusted as shown in Table 4

TABLE 4 - SOIL CHEMICAL CHARACTERISTICS FINAL SAMPLES

	Soil pH	Nitrate	Phosphorous	Ammonia Nitrogen	Nitrite
Reactor Vessel 1	7 8	50 ppm	100 ppm	10	ND
Reactor Vessel 2	7 6	50 ppm	100 ppm	10	ND
Reactor Vessel 3	7 3	30 ppm	50 ppm	40	ND
Reactor Vessel 4	7 6	20 ppm	37 5ppm	100	ND
Reactor Vessel 5	7 4	ND	12 5 ppm	100	ND
Reactor Vessel 6	7 9	<5 ppm	75 ppm	ND	ND
Reactor Vessel 7	7 9	<5 ppm	75 ppm	ND	ND

ND = Not Detected (<1ppm)

4.2 Treatability Study

A review of the study on a daily basis is necessary in order to understand what factors may be limiting bioremediation

On day one, the samples were allowed to stabilize after a composite soil sample had been made from the twelve discrete samples An aliquot of the composite sample was then analyzed for soil chemical characteristics This composite sample initially contained negligible amounts of nitrate and no ammonia or nitrite as previously discussed The composite sample also contained approximately 75 ppm of phosphorous The organic content of the composite sample was less than 1% and the sample had a moisture content of 11 54%

On day two of the study, the nutrients were added to the reactor vessels as discussed CO_2 production levels were measured for each reactor vessel The two control vessels showed minimal CO_2 production, as expected Reactor vessels 1 through 5, showed similar rates of CO_2 production. The live control (Reactor Vessel 7) did not receive any amendments, therefore it provided the baseline or background production rate for carbon dioxide levels

On day three, 24 hours after the initial addition of nutrients, the CO_2 level began to increase This increase in CO_2 level was due to the addition of nutrients and aeration by mixing the soils in the reactor vessels All vessels including the controls were agitated on a mechanical mixer for ten minutes Reactor vessels 1 through 5 showed production

levels greater than both the live control (Reactor Vessel 6) and the dead control (Reactor Vessel 7), as expected

On day four, the carbon dioxide levels were again measured in each reactor vessel CO_2 production levels had slightly decreased from the previous day This was expected since the samples were not mixed or aerated as they had been on day three The CO_2 production levels showed that reactor vessels 4 and 5 which contained the highest nutrient levels, yielded the highest CO_2 concentrations. All reactor vessels showed CO_2 production levels greater than the live control, which indicates that biological activity is occurring in all flasks because of physical and chemical amendments to the soils The killed control showed no discernible CO_2 production rate.

On days five, six, and seven, CO_2 production levels continued to fall Reactor vessels 1 through 5 did register CO_2 levels greater than the live control, which indicates that metabolic activity was occurring, although at lower levels than before After the CO_2 readings were taken on day seven, additional nutrients were added to the reactor vessels to determine if there would be a concomitant increase in metabolic activity Additional nutrients were also added since it was believed that there may have been some adsorption of the soils of the initial nutrients To overcome the adsorption effect, additional nutrients would be necessary

On day eight, there was an increase in metabolic activity, as evidenced by increased CO_2 rates The live control also showed slightly elevated CO_2 levels because of the aeration and mixing, as expected

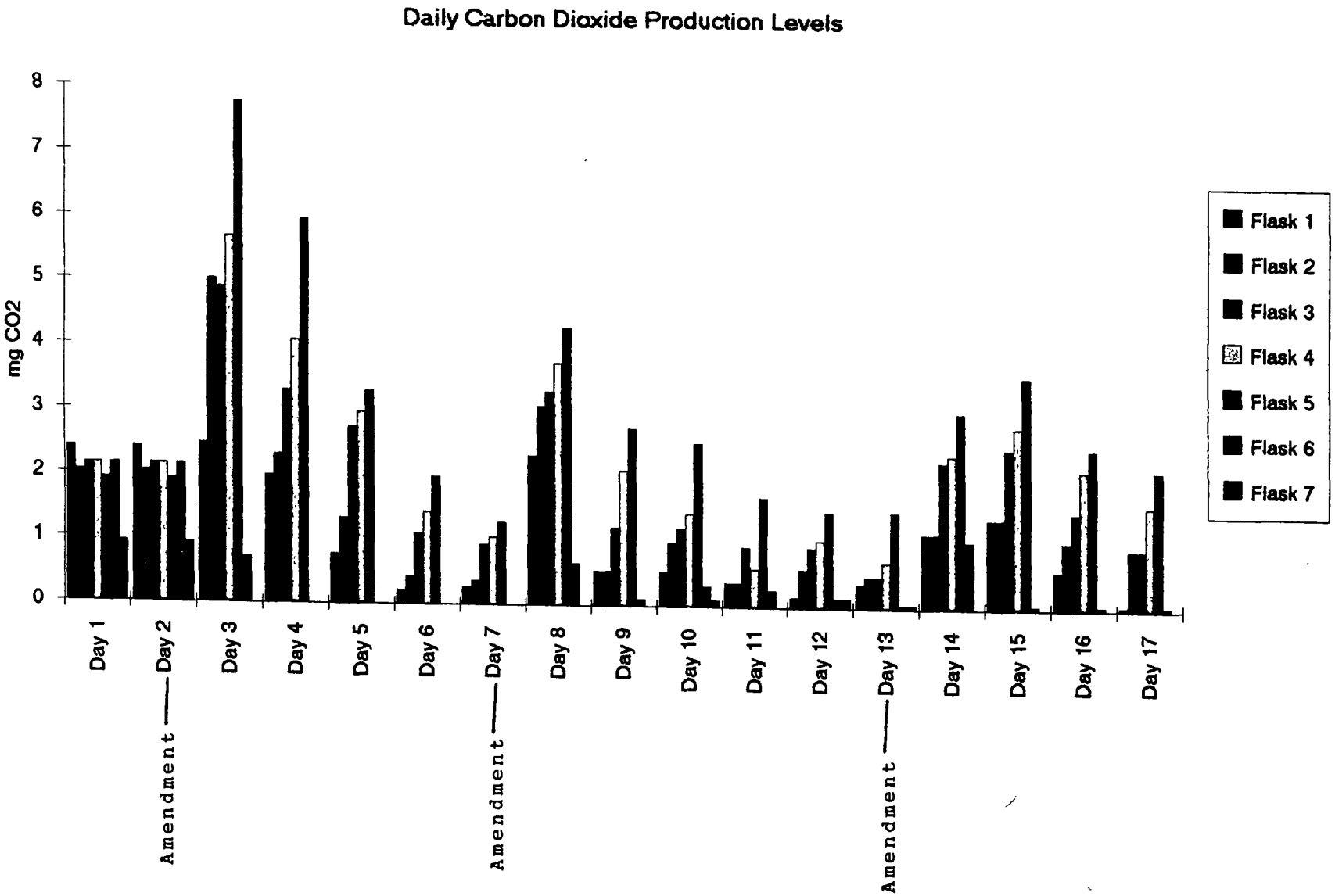
On day nine the CO_2 production levels again began to decrease Reactor vessels 4 and 5, which contained the highest concentrations of nutrients, yielded the greatest CO_2 production All reactor vessels again showed CO_2 production levels higher than that of the live control The dead control performed as expected with no CO_2 production

On days ten, eleven, twelve, and thirteen CO_2 production levels continued to fall. Reactor vessels 1 through 5 did register CO_2 levels greater than the live control, which indicates that metabolic activity was occurring, although at lower levels than before After the CO_2 readings were taken on day thirteen, additional nutrients were added to the reactor vessels to determine if there would be a simultaneous increase in metabolic activity

On days fourteen and fifteen there was an increase in metabolic activity, however, the response was not as dramatic as earlier amendments This is due in part to the build up of metabolic wastes in the small, controlled environment within the reactor vessel.

On days sixteen and seventeen, the CO_2 production levels began to decrease. Reactor vessels 1 through 5 did register CO_2 levels greater than the live control which indicated that metabolic activity was occurring, although at lower levels than before Reactor vessel 5, which contained 8% nutrients, achieved the highest sustained CO_2 production levels, indicating that lack of nutrients is a major factor presently inhibiting biodegradation (see Figure 3) Table 4 shows the final results of the chemical characteristics of the soil for each reactor vessel. The final chemical results indicate that the bacteria were nitrogen starved in all forms The pH had been adjusted to optimal levels for maximum bacterial growth.

Figure 3
Acustar - Dayton, Ohio



5.0 COLD STUDY

5.1 Introduction

In addition to the soil biotreatability study of the soils at ambient temperature at the Acustar Plant, **Clean Tech** also performed a biotreatability study on the soil at 4°C.

5.2 Study Background

The study was conducted using three (3) biometer vessels labeled A, B and C Reactor vessel A was amended on the second day with an 8% mixture of nutrients (N P = 10 15) Reactor vessel B was not amended and served as a live control This vessel provided background respiration rates for indigenous microbes whose environment were not amended. Reactor vessel C contained a composite sample in which the microbes present were destroyed chemically with sodium azide (1% v/w final concentration) All three reactor vessels were monitored for daily CO_2 production levels

TABLE 5 - BIOMETER FLASK COMPOSITIONS

Reactor Vessel	Nutrient Percentages (Nitrogen:Phosphorous)
A	8%
B	No amendments (Live control)
C	No amendments (Sodium Azide-killed control)

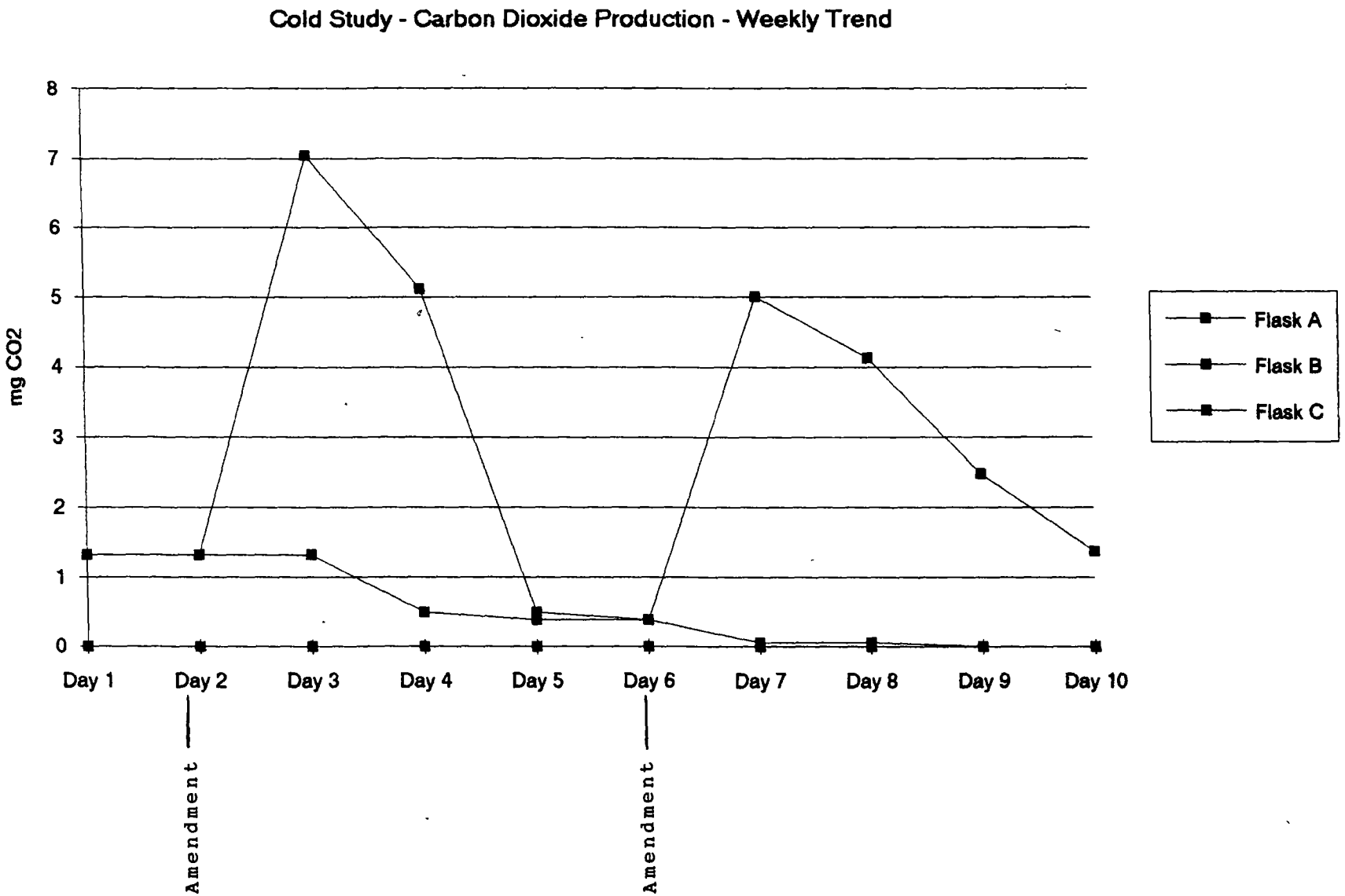
(Nutrients N P = 10 15 ratio)

This portion of the treatability study was conducted over a ten day (24 hour intervals) period Nutrients were added in 5 mL aliquots on day 2 It was anticipated that adsorption might dominate the response during the first days of the study before the nutrients reached equilibrium All other study conditions remained unaltered (see Figure 4)

5.3 Study Overview

A review of the study on a daily basis is necessary to understand what factors may be limiting bioremediation

Figure 4
Acustar - Dayton, Ohio



On day one, the samples were allowed to stabilize after a composite soil sample had been made from the twelve discrete samples An aliquot of the composite sample was then analyzed for soil chemical characteristics This composite sample initially contained no nitrate-nitrogen and no ammonia or nitrite as previously discussed. The composite sample also contained approximately 75 ppm of phosphorous The organic content of the composite sample was approximately 1% with a moisture content of 11.54%. The flasks were incubated at 4°C

On day two of the study, the nutrients were added to the reactor vessels as discussed. CO_2 production levels were measured for each reactor vessel The two control vessels showed minimal CO_2 production, as expected. Reactor vessel A showed the greatest increase in the rate of CO_2 production The live control (Reactor Vessel B) did not receive any amendments, therefore it provided the baseline or background production rate for carbon dioxide levels The flasks were incubated at 4°C

On day three, 24 hours after the initial addition of nutrients, the CO_2 level began to increase in reactor vessel A This increase in CO_2 level was due to the addition of nutrients and aeration by mixing the soils in the reactor vessels All vessels including the controls were agitated on a mechanical mixer for ten minutes Reactor vessel A showed a production level greater than both the live control (Reactor Vessel B) and the dead control (Reactor Vessel C) The flasks were again incubated at 4°C

On day four, the carbon dioxide levels were again measured in each reactor vessel CO_2 production levels had slightly decreased from the previous day This was expected since the samples were not mixed or aerated as they had been on day three The CO_2 production levels showed that reactor vessel A which contained the additional nutrients, yielded the highest CO_2 concentration Reactor vessel A showed a CO_2 production level greater than the live control, which indicates that biological activity is occurring in the flask because of physical and chemical amendments to the soils The killed control showed no discernible CO_2 production rate The flasks were again incubated at 4°C

On days five and six, CO_2 production levels continued to fall Reactor vessel A did register a CO_2 level greater than the live control, which indicates that metabolic activity was occurring, although at a lower level than before After the CO_2 readings were taken on day seven, additional nutrients were added to the reactor vessels to determine if there

would be a simultaneous increase in metabolic activity It was also believed that there may have been some adsorption on the soils of the initial nutrients and to overcome this, additional nutrients would be necessary

On day seven, there was an increase in metabolic activity, as evidenced by increased CO_2 rates. The controls also showed slightly elevated CO_2 levels because of the aeration and mixing, as expected.

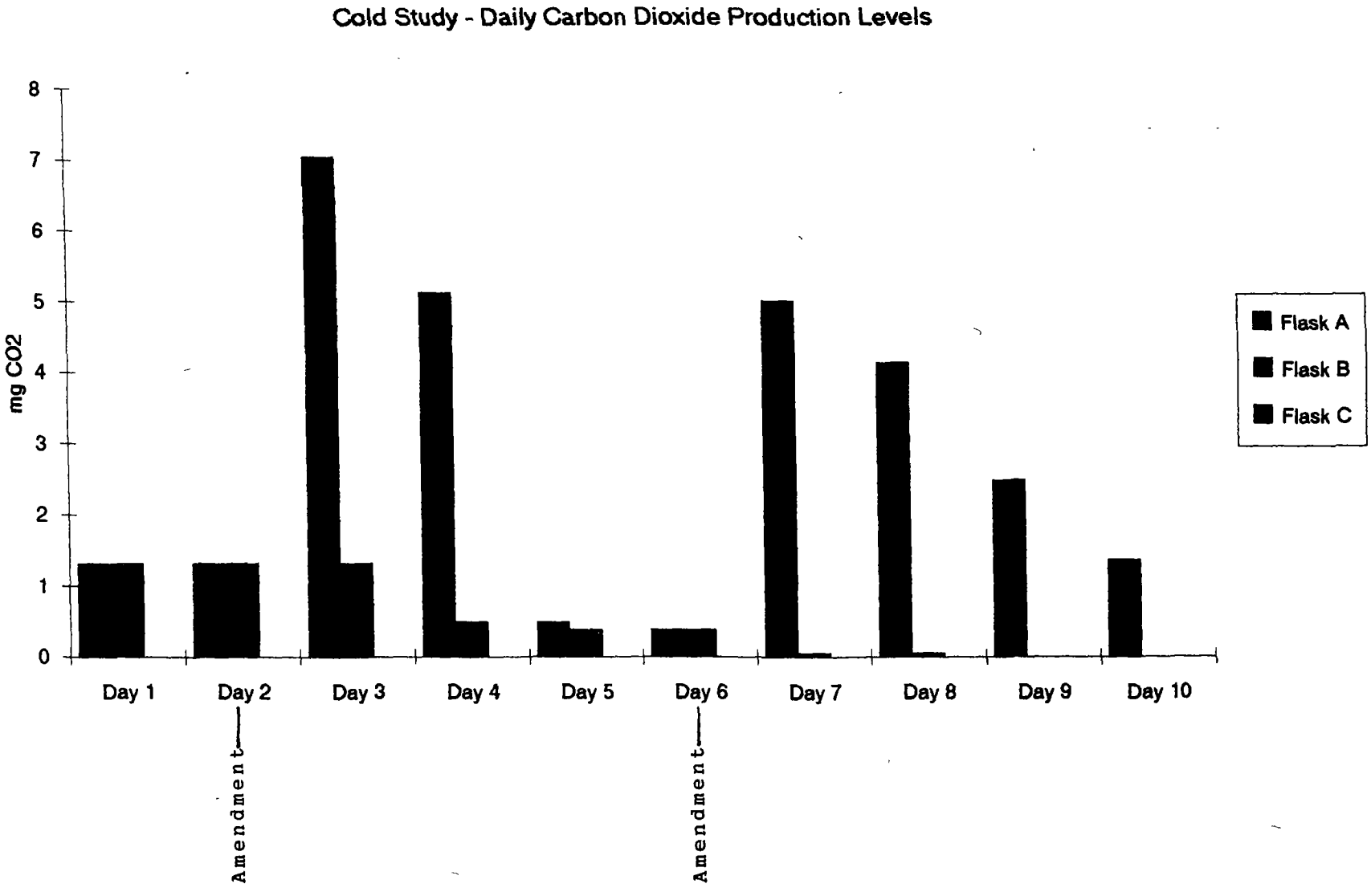
On day eight, nine, and ten, the CO_2 production levels began to decrease. Reactor vessel A did register a CO_2 level greater than the live control, which indicated that metabolic activity was occurring, although at a lower level than before Reactor vessel A, which contained 8% nutrients, achieved the highest sustained CO_2 production levels, indicating that lack of nutrients is a major factor presently inhibiting biodegradation (see Figure 5). Table 6 shows the final results of the chemical characteristics of the soil for each reactor vessel. The final chemical results indicate that the bacteria were nitrogen starved in all forms. The pH had been adjusted to optimal levels for maximum bacterial growth

TABLE 6 - SOIL CHEMICAL CHARACTERISTICS - FINAL SAMPLES

Reactor Vessel	pH	Nitrate	Phosphorous	Ammonia Nitrogen	Nitrite
A	7 6	ND	12 5 ppm	100 ppm	ND
B	7 2	<5 ppm	75 ppm	ND	ND
C	7 1	<5 ppm	75 ppm	ND	ND

ND = Not Detected (<1 ppm)

Figure 5
Acustar - Dayton, Ohio



6.0 CONCLUSIONS AND RECOMMENDATIONS

The feasibility study indicated that the lack of nutrients in the soils is one of the limiting factors at the Dayton site. Microbial respiration, as determined by measuring CO_2 evolution, confirmed that the growth of the indigenous microbial community under ambient conditions was occurring but at a very slow rate This indicates that even though hydrocarbon degrading microbes are present, the present environmental conditions do not allow the existing microbes to function effectively.

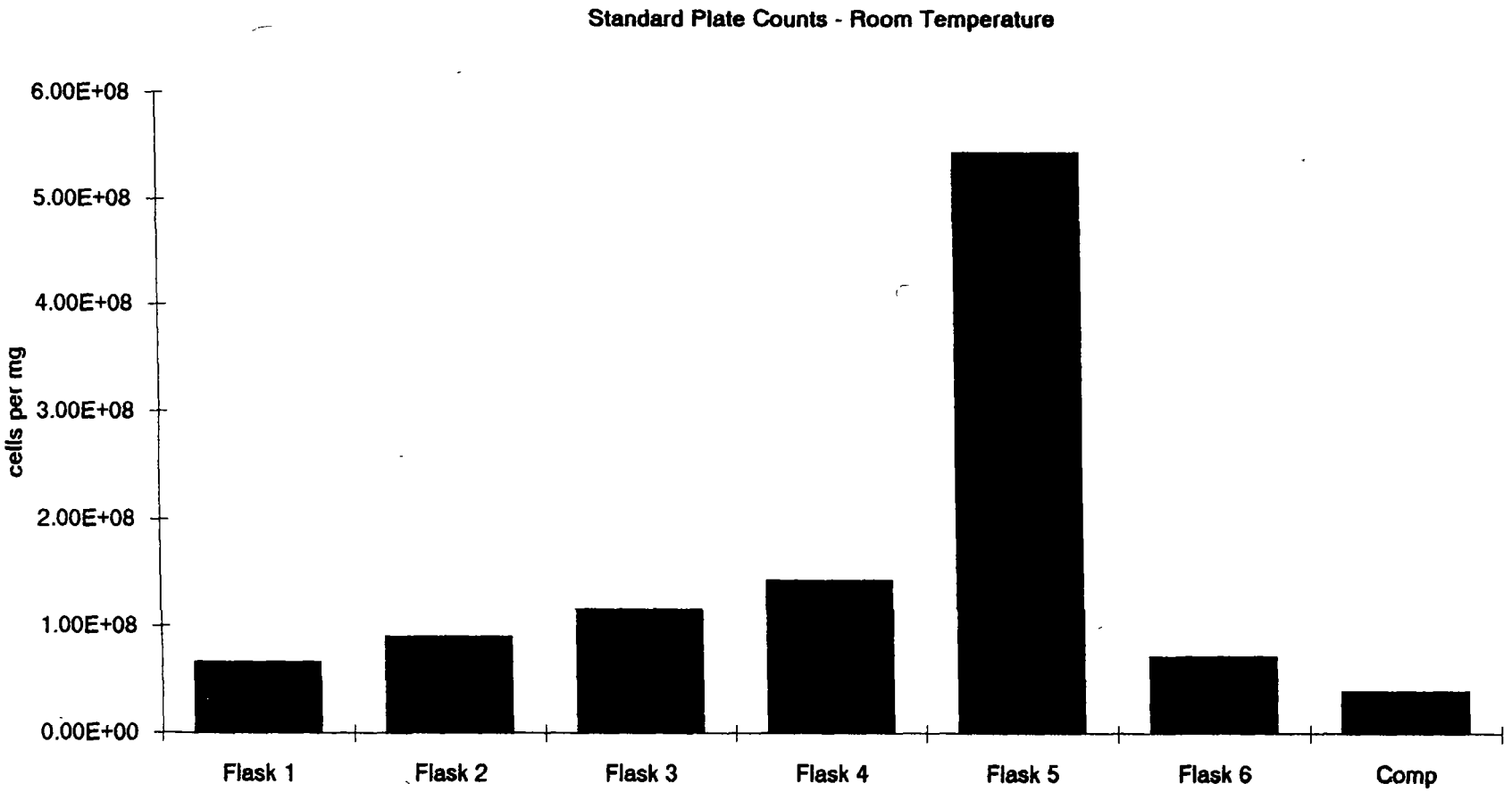
Degradation of hydrocarbons by enhanced biological methods is dependent on a number of factors. The most important factors include

- The existence of indigenous microbes capable of degrading the contaminants of concern,
- Hydrocarbon type and concentration,
- Soil type and structure,
- Nutrient availability,
- Moisture content,
- Oxygen availability (Aerobic processes)

The first factor was analyzed for this site. Fertile soils usually contain 10^7 to 10^9 microbes per gram of dry soil of which 10^5 to 10^6 are hydrocarbon degraders (prior to the addition of hydrocarbons) After hydrocarbons have been added, hydrocarbon degraders increase to 10^6 to 10^8 microbes per gram of dry soil

The composite soil sample was analyzed by standard plate count which is a direct quantitative measurement for aerobic and facultative anaerobes The standard plate count for the Dayton soil composite was 4 0 x 10^7 microbes per gram of dry soil (see Figure 6) These indicate that there is an indigenous microbial population at the site which have been impacted by site conditions If environmental conditions were suitable, the plate count should have been an order of magnitude greater The microbial population count will have to be significantly increased to achieve desired contaminant reduction levels

Figure 6
Acustar - Dayton, Ohio



The type of hydrocarbon and its concentration also have a significant impact on biological activity Hydrocarbons with less than 10 carbon atoms are relatively easy to degrade as long as the concentrations are not toxic to the bacteria As molecular size increases, the rate will decrease at an almost disproportionate rate Gasoline contains five to fourteen carbon atoms. Kerosene contains nine to eighteen carbon atoms. Light oils contain fourteen to eighteen carbon atoms and heavy oils contain nineteen to twenty five carbon atoms. The soils in this study were apparently contaminated with a variety of oils which contain approximately five to fourteen carbon atoms This may slow the rate of bioactivity.

In order to approximate total TPH levels in the soil composite sample, **Clean Tech** utilized EPA Method 9071. The initial soil composite contained an approximate TPH level of 113 ppm At the end of the study, Reactor Vessel 5 (8% nutrients) contained no detectable concentration of TPH The live control (Reactor Vessel 6) had an approximate end TPH value of 113 ppm The dead control (Reactor Vessel 7) had an approximate end TPH value of 113 ppm The above data indicates that the bacteria had successfully degraded the contaminants of concern as evidenced by the lack of contaminants in vessel 5

In order to determine the TPH levels in the Cold study, the same EPA Method 9071 was used Again the initial soil composite contained 113 ppm of TPH At the end of the study, Reactor Vessel A (8% nutrients) contained no detectable concentrations of TPH. The live control (Reactor Vessel B) had an end TPH value of 110 ppm The dead control (Reactor Vessel C) had an end TPH value of 110 ppm The above data, while only an approximation does show a consistent trend

The third factor affecting bioremediation is soil type This affects the ability of the soil to transmit air, water and nutrients More permeable soils allow rapid mobility of nutrients The soils analyzed in this study contained some silt and clay which may somewhat restrict permeability If the soils are excavated and amended with an organic source this will increase permeability The excavation and tilling process will also allow enhanced aeration to occur which will further increase the transfer of nutrients to the soils Soil pH will also

have to be adjusted If the soils are not excavated, a drainage system must be installed properly to allow rapid infiltration.

Nutrients and the bioavailability of nutrients is another critical factor Nitrogen and phosphorous are the most critical nutrients lacking in the test soils, although it is almost certain that other micronutrients are also deficient. The nutrients added in the study were rapidly depleted Another key factor which had affected nutrient availability is adsorption Clay soils have a high retention capacity for nutrients The initial addition of nutrients to the soils may have been tightly bound to the soil thereby allowing only minimal amounts to be available for microbial growth. Therefore, using standard stoichiometric equations will not provide feed rate solutions Assumptions must be made on the adsorptive capacity of the soils

Other factors which are important but which were not a restrictive factor in this study include temperature and moisture availability Temperature was kept stable at ambient conditions throughout the first part of the study at approximately 20°C However, during the second part of the study (Cold study) the temperature was kept stable at 4°C Even though both studies showed an increase in microbial activity, the ambient study indicated greater respiration rates and biomass production (See Figures 7 and 8) Moisture availability was also adequate The majority of the initial samples were above 10%, which is the level at which bioactivity becomes marginal

The last critical factor in this study is oxygen availability Oxygen availability controls the rate at which aerobic organisms can function One liter of air contains 20% oxygen or 256 mg of oxygen Bioactivity in unsaturated soils, is much faster than in saturated soils since an adequate air supply can be provided All samples were aerated at normal atmosphere concentrations Enhanced biodegradation will need additional dissolved oxygen

Figure 7
Acustar - Dayton, Ohio

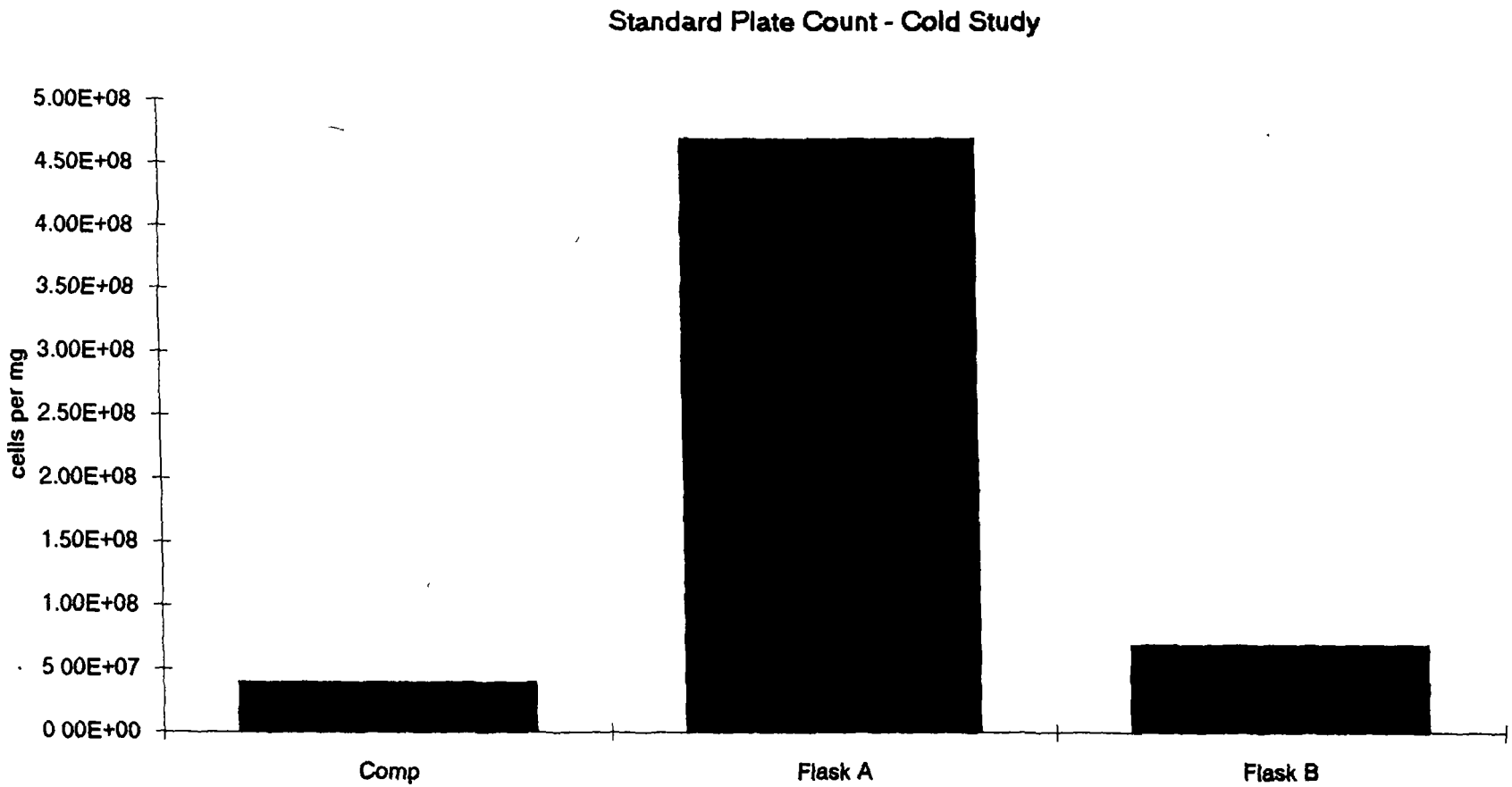
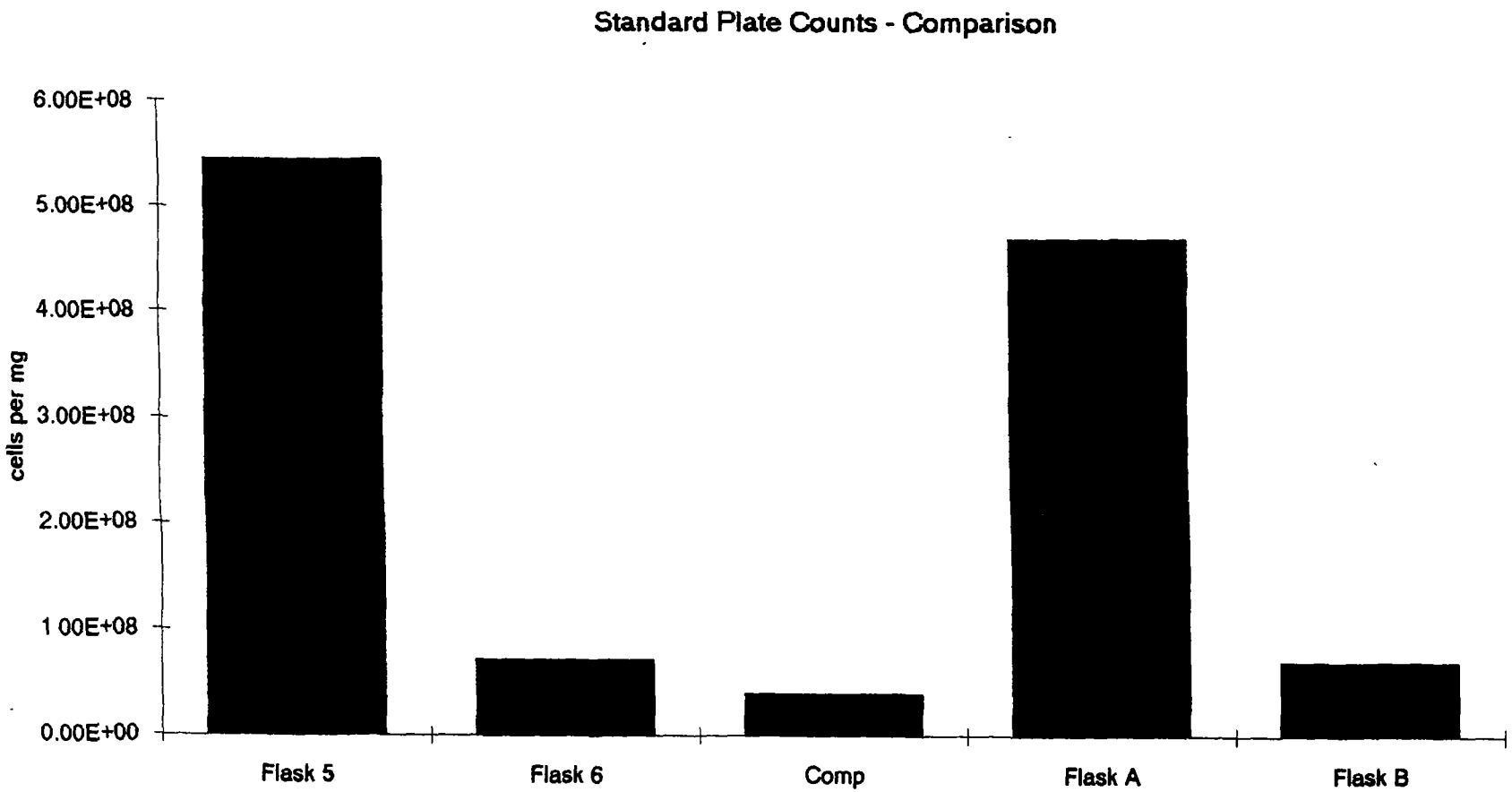


Figure 8
Acustar - Dayton, Ohio



In summary, the following recommendations are made

1. The study indicates that biological activity is occurring at the site although at low levels. The contaminants of concern can be degraded, as evidenced by this study The study indicated that there are several environmental factors at the site severely restricting biodegradation

2. Enhanced biodegradation will degrade the contaminants of concern however site conditions must be significantly altered. In order to increase the rate of biodegradation, microbial growth rates must be increased. This will be accomplished by adjusting the environmental factors which are restrictive. These include

   pH - The pH of the soil is near neutral to alkaline Once metabolic activity begins, the soils will become more acidic Additives must be used to adjust the pH to neutral levels

   Organic Matter - The soils have apparently been depleted of organic matter The soils should be amended with a peat or other organic rich substance This will not only increase the nutrients in the soil but will also assist with aeration, moisture and nutrient retention

   Nutrients - The study confirmed that all essential nutrients were lacking at the site The soils should be amended with nitrogen and phosphorous as discussed in previous sections

   Oxygen Availability - Oxygen levels must be increased in the soils to increase bioremediation

3) The feasibility study conducted on the soils indicated that microbial respiration, as determined by carbon dioxide evolution measurements, was occurring The study indicated that the growth of the indigenous community under ambient conditions was occurring but at a very slow rate Even though hydrocarbon degrading microbes are present, the present environmental conditions do not allow the existing microbes to function effectively

4) A pilot study should be completed in the field with the soils amended as described in this report The soils should be placed on a liner system which will capture run-on and run-off The site should be monitored for all the key factors such as, pH, temperature, bacterial enumeration, nutrient levels, and contaminant levels. It would also be helpful to include in-place lysimeters which would measure CO_2 production levels in the field The study should closely simulate the conditions which would exist for land-farming

The study did conclude that biological activity was occurring at minimal rates due to restrictive site factors. Nutrient concentrations must be maintained to sustain biological activity due to the retention of nutrients by the soils. Oxygen availability is another major factor. The soils must be treated in a manner such that the microbes do not experience anaerobic conditions The study did confirm that the soils on the site were amendable to bioremediation

A combination of site factors and the type and concentrations of contaminants have affected biodegradation A pilot test should be designed to mitigate these limiting factors

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SOLID PHASE BIOREMEDIATION TECHNOLOGIES OF PETROLEUM CONTAMINATED SOILS

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APPLICATION OF SOLID PHASE BIOREMEDIATION TECHNOLOGIES OF PETROLEUM CONTAMINATED SOILS

ABSTRACT

Bioremediation technologies use microorganisms (both bacteria and fungi) to degrade contaminants such as petroleum hydrocarbons, chlorinated solvents and halogenated aromatic hydrocarbons. Bioremediation technologies can be used to effectively remediate contaminated water, air and soils through effectively mitigating rate limiting factors to optimize the process. This report will detail the process of treating soils biologically to decontaminate soil impacted by fuel oils and hydraulic lubricating oils at the Chrysler Facility in Dayton, Ohio.

This technology was applied to remediate contaminated soils that were stockpiled into two separate piles. Investigations during construction and demolition activities indicated that the soils had been impacted by fuel oils and hydraulic oils

The soils were analyzed for Total Petroleum Hydrocarbons (TPH). Previous analytical reports were obtained for volatiles. Concentrations ranged from approximately 300 mg/kg in the most contaminated areas to non-detect in the least contaminated areas. Regulatory imposed cleanup criteria was 105 mg/kg for TPH. Prior to moving the soils to a treatment cell, a treatability study was completed. The study provided critical information on environmental limiting factors such as, oxygen requirements, nutrients and cofactors, and bacterial population data.

After the treatability study determined that the soils were amenable to bioremediation, the individual soil piles were moved and combined into one, lined treatment cell. The

treatment cell was lined with a PVC liner. A bioreactor was mobilized on-site to supply nutrients, bacteria and other supplements to the soils to enhance the biodegradation process. Run-off from the treatment cell was captured in a sump and pumped into the bioreactor where the water was amended with nutrients and bacteria and recirculated back into the treatment cell.

In approximately 200 days of treatment, TPH was analyzed and the soils were below Ohio EPA standards of 105 mg/kg.

SECTION 1.0 - INTRODUCTION

Bioremediation is capable of degrading organic compounds in contaminated soils. The method of applications may vary but all bioremediation applications use microorganisms indigenous to the site (bacteria and fungi) to degrade the contaminants of concern to carbon dioxide, cell mass and water. The rates of bioremediation of contaminated soils are controlled by optimizing the following: oxygen levels, moisture content, nutrient availability, pH, soil type, and the bacterial population.

A solid phase biotreatment program requires optimization of these factors to accelerate degradation rates. The following sections discuss in greater detail the results of the bioremediation program at the Dayton site.

SECTION 2.0 -BACKGROUND

The Dayton Thermal Products (DTP) plant is part of Chrysler Components, a division of the Chrysler Corporation (Chrysler). The site is located at 1600 Webster Street in Dayton, Ohio. The facility encompasses approximately 60 acres and contains over 1.3 million square feet under roof. Current operations at the facility include the manufacture, assembly and finishing of heat exchangers and air conditioning components for motor vehicles. The facility consists of eight manufacturing buildings, a powerhouse, wastewater treatment plant and associated storage buildings.

Past operations at the site prior to Chrysler's acquisition in 1936 included the assembly of Maxwell automobiles from about 1907 through 1936, and other manufacturing processes such as furnaces, gun parts, aluminum and copper tube forming operations, light machining, plating, metal stamping, welding, soldering, degreasing, painting, plastic

molding and assembly, as well as maintenance of these processes, equipment and structures. The Maxwell Complex, which was a group of twelve former buildings, was used by Chrysler until 1990 when it was demolished. A portion of the Maxwell Complex footprint was replaced by a new manufacturing building (number 59) in 1991. Investigations completed during the demolition and construction indicated that the soils were impacted with petroleum hydrocarbons and volatiles. The excavated soils were stockpiled on site to be remediated at a later date.

SECTION 3.0 - BIOTREATABLITY STUDY

The purpose of the biotreatability study was to determine if indigenous microorganisms found at DTP were capable of degrading the petroleum hydrocarbons found in the soil. The treatability study also included extensive testing of the TPH concentration in the excavated soils.

SOIL SAMPLING

In order to determine the extent of contamination and to collect a representative collection of samples for the treatability study, several composite soil samples were taken from the two (2) soil piles contained on site. The first set of six (6) samples were taken from the pile designated the "TPH pile". These samples were composites which were collected from borings at the top of the pile and at various locations on the side slopes of the piles. The borings had an average depth of four (4) feet.

The second set of six (6) samples were taken from the pile designated as the "unknown pile" A total of six (6) composite samples were taken from borings at the top and from various locations on the side slopes of the pile. The borings had an average depth of six (6) feet.

TREATABILITY STUDY

The soil samples were analyzed for pH, nitrate-nitrogen, phosphorous, organic matter, ammonia-nitrogen, nitrite-nitrogen and soil moisture prior to beginning the treatability study. The following table presents the results of those analyses.

TABLE 1

SOIL CHEMICAL CHARACTERISTICS - INITIAL SAMPLES - DAYTON

Sample No.	pH	Nitrate	Phosphorous	Ammonia Nitrogen	Nitrite	Organic Content	Moisture %
TPH1	8.2	<5 ppm	100 ppm	ND	ND	ND	19.65
TPH2	8.1	<5 ppm	75 ppm	ND	ND	ND	17.87
TPH3	8.2	<5 ppm	100 ppm	ND	ND	ND	20.2
TPH4	8.5	<5 ppm	75 ppm	ND	ND	ND	9.8
TPH5	8.5	<5 ppm	100 ppm	ND	ND	ND	2.11
TPH6	8.1	<5 ppm	100 ppm	ND	ND	ND	7.34
Unknown 1	8.3	<5 ppm	75 ppm	ND	ND	ND	7.38
Unknown 2	8.2	10 ppm	100 ppm	ND	ND	ND	6.01
Unknown 3	8.6	<5 ppm	75 ppm	ND	ND	ND	8.24
Unknown 4	8.3	<5 ppm	75 ppm	ND	ND	ND	9.75
Unknown 5	8.4	<5 ppm	100 ppm	ND	ND	ND	8.47
Unknown 6	8.2	<5 ppm	75 ppm	ND	ND	ND	6.43
TPH Average *	8.25	<5 ppm	91.67 ppm	ND	ND	ND	12.8
Unknown Average*	8.3	<5 ppm	83.3 ppm	ND	ND	ND	7.7
Composite *	8.2	<5 ppm	75 ppm	ND	ND	ND	11.54

NOTE
*Average - The arithmetic average of the samples taken from DTP
*Composite - The chemical characteristics of the samples used for the biotreatability study which was a composite from each of the twelve samples
ND = Not Detected (<1 ppm)

To initiate the study, a composite was taken from the twelve soil samples to create one composite sample for the treatability study. Fifty (50) grams of this composite sample were analyzed for initial TPH content.

Next, approximately fifty (50) grams of the composite sample were placed into each reactor vessel. The reactor vessels were allowed to stabilize and become acclimated for a period of two (2) days before their physical and chemical environments were altered. This permitted the determination of background respiration rates for each reactor vessel of what is known as the "lag phase" of bacterial growth.

Before the amendments were added, respiration rates during the lag phase were measured to ensure that the flasks which were amended were below or equal to the respiration rates measured in the two (2) control flasks. A total of five treatment variations were completed for the study. The reactor vessels were amended in the following manner:

TABLE 2

BIOMETER FLASK COMPOSITES

Reactor Vessel	Nutrient Percentages (Nitrogen, Phosphorous)
1	2%
2	4%
3	5%
4	6%
5	8%
6	No amendments (Live Control)
7	No amendments (Sodium Azide - Killed Control)

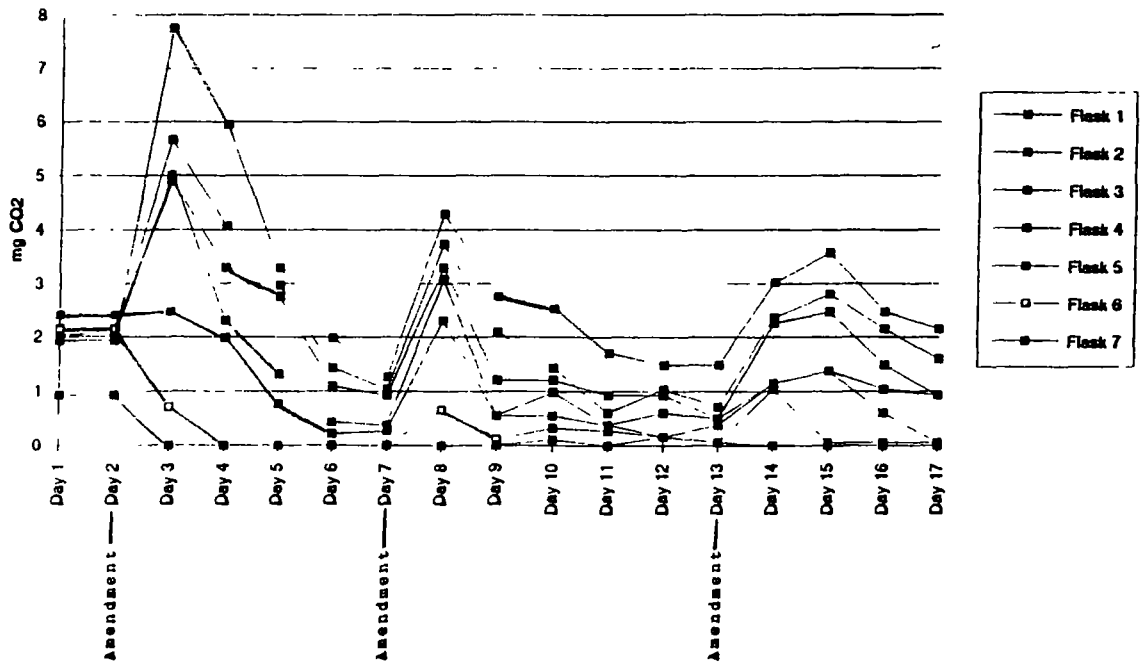
(NOTE: Nutrients: N:P = 10:15 ratio)

Biometer flasks numbers 6 and 7 were tested as controls. Flask number 6 contained a portion of the composite sample that was not chemically killed. This flask served as a

live control that provided background respiration rates of the bacteria throughout the study. Flask number 7 also contained a portion of the composite sample, but any microbes present in the sample were destroyed chemically with sodium azide (1% v/w final concentration). This second control provided data on the amount of carbon dioxide which could evolve from the soil and not the microbes.

The study was conducted over a ten day period (day in this study refers to a 24 hour period). All of the flasks were monitored for daily CO_2 production levels. As mentioned earlier, the flasks were allowed to equilibrate for two days (48 hours) before the nutrient amendments were added. Additional nutrients were added on Day four because the majority of nutrients were adsorbed to the clay of the soils, thereby making it unavailable. The second addition of an aliquot of nutrients was used to assess its affect on microbial activity.

CO2 GRAPH FROM TREAT STUDY



STUDY RESULTS

The purpose of the treatability study was to determine the site conditions which should be altered for optimal biodegradation. The study concluded that biological activity was occurring at minimal rates at the site due to restrictive growth factors. In order to increase the rate of biodegradation the microbial population could be increased by adjusting those environmental factors found to be restrictive which included:

- pH - The existing soils were slightly alkaline. Therefore, the pH of the soil needed to be neutralized. However, as the bacteria reduce the contaminants of concern, the pH of the soil will be reduced or acidified.
- Organic matter - It was determined that the site soils were depleted of organic matter. The soils need to be amended with peat or other organic rich substances during bioremediation. This will increase the nutrients present in the soil and also assist with aeration.
- Nutrients - The treatability study confirmed that all essential nutrients were lacking in the site soils. The soils needed to be amended with nitrogen and phosphorous to enhance biodegradation.
- Oxygen Availability - Due to the soils being stockpiled, oxygen diffusion did not occur readily.

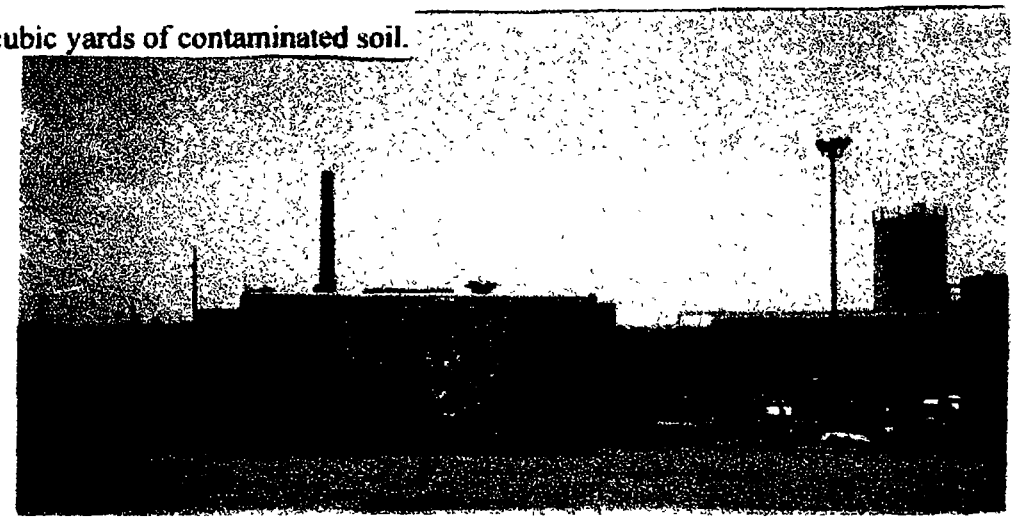
In summary, the treatability study indicated that biological activity was occurring at minimal levels due to restrictive growth factors at the site. Much higher nutrient amendments were required to sustain biological activity due in part to high nutrient adsorption capacity of the site soils and increased oxygen availability was necessary. Based on the observations of the treatability study, it was determined that full scale

bioremediation of the impacted soils was possible as long as the restrictive growth factors were monitored periodically.

SECTION 4.0 - BIOREMEDIATION OF [illegible] IMPACTED SOILS

TREATMENT CELL CONSTRUCTION

In order to remediate the soils, it was necessary to consolidate the soils into one treatment cell. A 15 mil liner was installed over an existing area of pavement near the railroad tracks. The liner was impermeable to prevent any contaminants from leaching into the soils beneath the treatment cell. The soils were then placed on the liner system in a series of 2 lifts. The first lift was four (4) feet high, the second lift was three (3) feet high. Upon completion of the lifts, the entire biotreatment cell perimeter was surrounded by an earthen berm. The average depth of the soils placed in the treatment cell was approximately seven (7) feet. Once filled, the treatment cell contained approximately 15,000 cubic yards of contaminated soil.



BIOREACTOR OVERVIEW

The bioreactor utilized at the site was a modified sequencing batch reactor (MSBR). The MSBR was filled on a semi-continuous basis using a fill consisting of potable water and/or recycled water from the treatment cell. The MSBR was controlled through a series of internal floats. Once the reactor was filled and operational, the system was continuously mixed and aerated by a diffuser system. As the mixing was occurring, the microbes identified and cultured in the earlier treatability study were fed into the reactor

on a semi-continuous basis. The addition of selected nutrients occurred continuously with periodic adjustments, which was based on analyses. The nutrient rich, microbe laden water was then discharged through a series of PVC pipes which vertically penetrated the surface of the treatment cell. Introducing the discharge to the top of the treatment cell allowed for the total filtration of the microbes and nutrients throughout the contaminated soil. The bioreactor became operational in July 1993.

BIOLOGICAL MONITORING THROUGH THE BIOTREATMENT PROCESS

The soils in the treatment cell were periodically analyzed for the following parameters: pH, phosphorous, nitrate, nitrite, and ammonia. In addition to these parameters, soil moisture and TPH were also analyzed. The analytical methods used were as follows:

- Soil pH - EPA Method 9045;
- Soil phosphorous - EPA Method 365.3 Modified;
- Nitrate - EPA Method 350.2 Modified;
- Nitrite - EPA Method 353.2 Modified;
- Ammonia - Modified EPA Method 350.2 - Nesslers;
- Soil moisture - Standard Method 2540-G;
- TPH - EPA Method 9071.

In addition, the soils were periodically monitored for microbial population and respiration.

BIOLOGICAL CONTROL MONITORING REQUIREMENTS

The treatability study concluded that there were indigenous microbes on-site which were capable of degrading the contaminants of concern. In order to accelerate the growth of microorganisms, site conditions were altered to those determined optimal during the treatability study. The following is a discussion of the treatment cell chemical and biological characteristics.

pH

The initial pH characteristics of the soil were slightly basic. The pH at the start of remediation averaged 8.2. As the soils continued to be amended, the pH decreased to 7.25 which is more acceptable for bioremediation.

Nutrient Concentration

The treatability study concluded that the soils were depleted in such essential nutrients as nitrogen and phosphorous. Ammonia as nitrogen, nitrite and nitrate as well as phosphate were analyzed routinely throughout treatment. Phosphate averaged 75 mg/kg at the start of the treatment program. Levels increased throughout the study until the end of the treatment with a final concentration of phosphorous of more than 200 mg/kg. Nitrate concentrations were below detection limits at the start of the treatment program. Concentration continued to increase throughout the treatment program and at the end of the remediation program was 15 mg/kg.

MICROBIAL POPULATION

The soils were also analyzed to determine microbial growth using the standard plate count method, which is a direct quantitative measurement of viable aerobic and facultative anaerobic bacteria present in the soil. The method used to quantify the bacterial population in the soil was adapted from the method as outlined in EPA Microbiological Methods for Monitoring the Environment (EPA 600/8-78-017). The microbial population at the start of treatment averaged 10^7 colony forming units per gram (cfu/g) and increased to more than 10^{15} cfu/g at the completion of the remediation program. At microbial concentrations of more than 10^6 cfu/g, contaminant reduction in

soil has been documented to be a function of the activity of the microbial population.[1] The growth in the population of microbes indicated that the addition of the nutrients and other factors were also degrading the contaminants of concern.

[1] Bianchini, Porter, Pugisaki - Detection of Optimal Toxicant Loads for Biological Closure of a Hazardous Waste Site, Aquatic Toxicology Annual Symposium, 1986.

SECTION 5.0 - DISCUSSION

INORGANIC COMPOSITE SOILS

The key to accelerating the natural biodegradation process was to provide a sufficient concentration of nutrients and minerals for the indigenous bacteria. The inorganic material must be readily available to the bacteria present in the soil. Nitrogen, in all forms, as well as phosphorous were the most critical nutrients lacking in the soils at DTP. This was determined in the treatability study and confirmed during the treatment of the contaminated soils.

The initial sampling confirmed that the soils in the treatment cell were lacking the essential nutrients needed to accelerate the natural biodegradation process. As treatment progressed, the soils increased in nitrate and phosphorous. As the bioreactor system continued to feed the treatment cell, the levels of nutrients gradually increased until nutrients were no longer the limiting factor in the bioremediation of these soils.

STANDARD PLATE COUNT

To evaluate biological activity, total heterotrophic organisms in the treatment cell were enumerated. Samples were plated onto mineral media containing specific hydrocarbons which were the sole source of carbon. The soils were plated on substrate specific hydrocarbon to identify and study the specific organisms. The microbial population in the treatment cell increased over time due to a number of factors. The first factor included the continuous nutrient feed supply from the bioreactor. The second factor affecting microbial cell counts was the continuous feed of microbe laden water from the bioreactor. As the system continued to operate the microbial population was monitored to ensure that the population continued to increase. This data used in conjunction with

the TPH results indicated the rate at which the microbes were remediating the soils in the treatment cell.

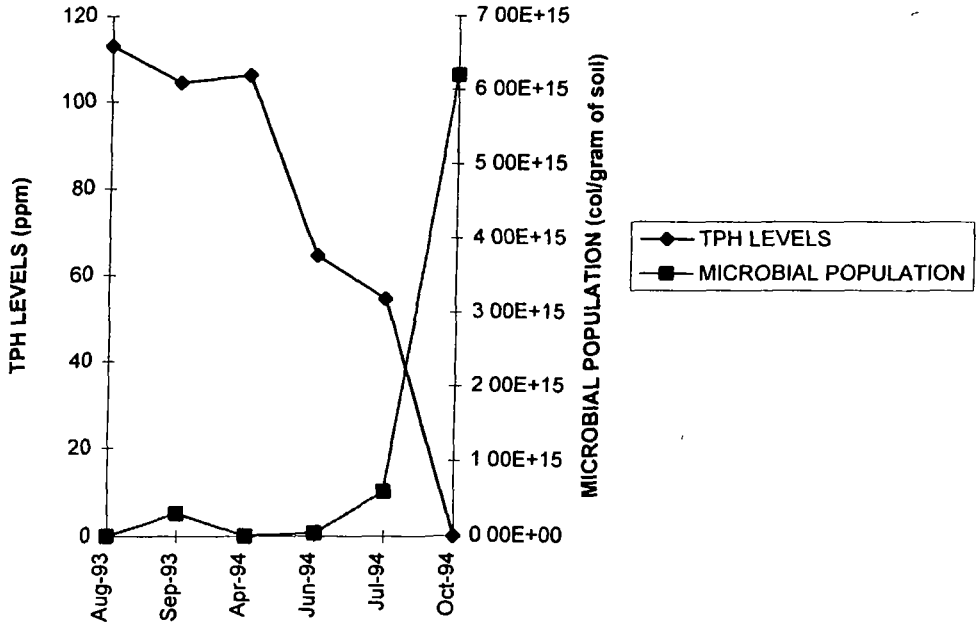
TPH Monitoring

Soils in the treatment cell were analyzed periodically for TPH concentration using Method 9081. The soil TPH concentration decreased on average from 113 ppm to <10 ppm. Over the fourteen (14) month period that the bioreactor operated, TPH values decreased overall by 99%, due to the continuous feed of nutrient enriched, microbe laden water to the bacteria present in the soil. The results indicate a high initial contaminant reduction followed by a period of reduced rate as the concentrations of TPH were reduced and as the microbial community changed.

SECTION 6.0 - CONCLUSIONS

After approximately eight weeks of operation, microbial activity at the site began to increase. The analyses indicated the population of hydrocarbon degrading microbes increased throughout the treatment process. Environmental conditions of the soils were greatly improved over those found initially which allowed the indigenous microbes to function at optimal levels.

The graph below illustrates the correlation between decreasing TPH concentrations and increasing microbial numbers throughout the treatment process. The graph illustrates the effectiveness of the existing microbial population to degrade the contaminants of concern.



6-Sep-93

Doug Orf
Acustar
1600 Webster Street
Dayton, OH 45404

PROJECT NUMBER: 6001
PROJECT : CHRYSLER - ACUSTAR

ANALYSIS/ METHOD	RESULTS	UNITS	DATE ANALYZED	MDL
SAMPLE CODE: Biotreatment Cell Composite				
DATE SAMPLE COLLECTED:8/19/93				
TPH/EPA 9071	113.0	mg/L	24-Aug-93	10.0

Christopher J. Candela
Environmental Scientist

All analyses are performed in accordance with those outlined in EPA Methods for Chemical Analysis of Water and Wastes and in Standard Methods for the Examination of Water and Waste Water, 17th edition, unless otherwise noted.

18-Oct-93

Doug Orf
Acustar
1600 Webster Street
Dayton, OH 45404

PROJECT NUMBER: 6001
PROJECT : CHRYSLER - ACUSTAR

ANALYSIS/ METHOD	RESULTS	UNITS	DATE ANALYZED	MDL
SAMPLE CODE: Biotreatment Cell Sample D-1 **DATE SAMPLE COLLECTED:9/30/93**				
TPH/EPA 9071	115.0	mg/L	12-Oct-93	10.0
SAMPLE CODE: Biotreatment Cell Sample D-2 **DATE SAMPLE COLLECTED:9/30/93**				
TPH/EPA 9071	98.0	mg/L	12-Oct-93	10.0
SAMPLE CODE: Biotreatment Cell Sample D-3 **DATE SAMPLE COLLECTED:9/30/93**				
TPH/EPA 9071	100.0	mg/L	12-Oct-93	10.0

SAMPLE CODE: Biotreatment Cell Sample D-4

DATE SAMPLE COLLECTED:9/30/93

TPH/EPA 9071	105.0	mg/L	12-Oct-93	10.0

Christopher J. Candela
Environmental Scientist

All analyses are performed in accordance with those outlined in EPA Methods for Chemical Analysis of Water and Wastes and in Standard Methods for the Examination of Water and Waste Water, 17th edition, unless otherwise noted.

28-Apr-94

Doug Orf
Acustar
1600 Webster Street
Dayton, OH 45404

PROJECT NUMBER: 6001
PROJECT : CHRYSLER - ACUSTAR

ANALYSIS/ METHOD	RESULTS	UNITS	DATE ANALYZED	MDL
SAMPLE CODE: Biotreatment Cell Sample D-1				
DATE SAMPLE COLLECTED:4/7/94				
TPH/EPA 9071	115.0	mg/L	18-Apr-94	10.0
SAMPLE CODE: Biotreatment Cell Sample D-2				
DATE SAMPLE COLLECTED:4/7/94				
TPH/EPA 9071	100.0	mg/L	18-Apr-94	10.0
SAMPLE CODE: Biotreatment Cell Sample D-3				
DATE SAMPLE COLLECTED:4/7/94				
TPH/EPA 9071	105.0	mg/L	18-Apr-94	10.0

SAMPLE CODE: Biotreatment Cell Sample D-4
DATE SAMPLE COLLECTED:4/7/94

TPH/EPA 9071	105.0	mg/L	18-Apr-94	10.0

Christopher J. Candela
Environmental Scientist

All analyses are performed in accordance with those outlined in EPA Methods for Chemical Analysis of Water and Wastes and in Standard Methods for the Examination of Water and Waste Water, 17th edition, unless otherwise noted.

28-Jul-94

Doug Orf
Acustar
1600 Webster Street
Dayton, OH 45404

PROJECT NUMBER: 6001
PROJECT : CHRYSLER - ACUSTAR

ANALYSIS/ METHOD	RESULTS	UNITS	DATE ANALYZED	MDL
SAMPLE CODE: Biotreatment Cell Sample D-1 **DATE SAMPLE COLLECTED:6/12/94**				
TPH/EPA 9071	28.3	mg/L	27-Jun-94	10.0
SAMPLE CODE: Biotreatment Cell Sample D-2 **DATE SAMPLE COLLECTED:6/12/94**				
TPH/EPA 9071	113.4	mg/L	27-Jun-94	10.0
SAMPLE CODE: Biotreatment Cell Sample D-3 **DATE SAMPLE COLLECTED:6/12/94**				
TPH/EPA 9071	85.0	mg/L	27-Jun-94	10.0

SAMPLE CODE: Biotreatment Cell Sample D-4
DATE SAMPLE COLLECTED:6/12/94

TPH/EPA 9071	56.7	mg/L	27-Jun-94	10.0

Christopher J. Candela
Environmental Scientist

All analyses are performed in accordance with those outlined in EPA Methods for Chemical Analysis of Water and Wastes and in Standard Methods for the Examination of Water and Waste Water, 17th edition, unless otherwise noted.

3-Aug-94

Doug Orf
Acustar
1600 Webster Street
Dayton, OH 45404

PROJECT NUMBER: 6001
PROJECT : CHRYSLER - ACUSTAR

ANALYSIS/ METHOD	RESULTS	UNITS	DATE ANALYZED	MDL
SAMPLE CODE: Biotreatment Cell Sample D-1				
DATE SAMPLE COLLECTED:7/19/94				
TPH/EPA 9071	20.0	mg/L	27-Jul-94	10.0
SAMPLE CODE: Biotreatment Cell Sample D-2				
DATE SAMPLE COLLECTED:7/19/94				
TPH/EPA 9071	95.6	mg/L	27-Jul-94	10.0
SAMPLE CODE: Biotreatment Cell Sample D-3				
DATE SAMPLE COLLECTED:7/19/94				
TPH/EPA 9071	70.0	mg/L	27-Jul-94	10.0

SAMPLE CODE: Biotreatment Cell Sample D-4
DATE SAMPLE COLLECTED:7/19/94

TPH/EPA 9071	32.8	mg/L	27-Jul-94	10.0

Christopher J. Candela
Environmental Scientist

All analyses are performed in accordance with those outlined in EPA Methods for Chemical Analysis of Water and Wastes and in Standard Methods for the Examination of Water and Waste Water, 17th edition, unless otherwise noted.

3-Nov-94

Doug Orf
Acustar
1600 Webster Street
Dayton, OH 45404

PROJECT NUMBER: 6001
PROJECT : CHRYSLER - ACUSTAR

ANALYSIS/ METHOD	RESULTS	UNITS	DATE ANALYZED	MDL
SAMPLE CODE: Biotreatment Cell Sample D-1 **DATE SAMPLE COLLECTED:10/21/94**				
TPH/EPA 9071	ND	mg/L	25-Oct-94	10.0
SAMPLE CODE: Biotreatment Cell Sample D-2 **DATE SAMPLE COLLECTED:10/21/94**				
TPH/EPA 9071	ND	mg/L	25-Oct-94	10.0
SAMPLE CODE: Biotreatment Cell Sample D-3 **DATE SAMPLE COLLECTED:10/21/94**				
TPH/EPA 9071	ND	mg/L	25-Oct-94	10.0

SAMPLE CODE: Biotreatment Cell Sample D-4
DATE SAMPLE COLLECTED:10/21/94

TPH/EPA 9071	ND	mg/L	25-Oct-94	10.0

*** Sample splits sent to third party laboratory for analysis verification. ***

Christopher J. Candela
Environmental Scientist

All analyses are performed in accordance with those outlined in EPA Methods for Chemical Analysis of Water and Wastes and in Standard Methods for the Examination of Water and Waste Water, 17th edition, unless otherwise noted.

From: Medlab Environmental Testing, Inc.
212 Cherry Lane
New Castle, DE 19720

February 27, 1995

To: Clean Technologies
2700 Capitol Trail
Newark, DE 19711

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

Sample I.D. AA68855 — Client Code: CLEAN-01
Purchase order number: 350 — SAMPLE LOCATION: [redacted]
SAMPLE ID: [redacted]
Sample collection date: 10/14/94 — Time: 08:30
Lab submittal date: [redacted] — Time: 15:10
Job Name: Chrysler Twinsburg — Telephone Number: 999-0934
FAX Number: 999-0928

Parameter	Result	Units	MDL
BTEX by GC/PID	see below	ug/kg	
Diesel Range Organics	<10	mg/kg	10

Data for BTEX by GC/PID ug/kg:

Component Name	Result	Component MDL
Benzene	5 U	5
Toluene	5 U	5
Ethyl Benzene	5 U	5
m&p-Xylene	10 U	10
o-Xylene	5 U	5

If there are any questions regarding this data, please call.

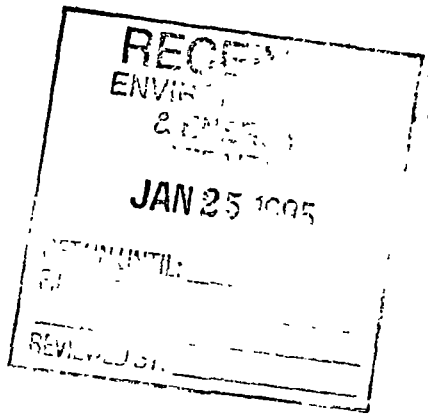
John R Harvey for

Michael Shmockler, Ph.D.
Laboratory Director

CLEANTECH

Clean Tech, Inc
Environmental Consultants

2700 Capitol Trail
Newark, DE 19711
302•999•0924
FAX 302•999•0925



January 17, 1995

Mr Curtis Chapman
Chrysler Corporation
2301 Featherstone Road
CIMS 429-02-04
Auburn Hills, MI 48326-2808

RE: Site Investigation Status
Chrysler Dayton Thermal Products
Dayton, Ohio

Dear Mr. Chapman:

Site investigation activities during the installation of soil borings and groundwater monitoring wells have generated both soil and groundwater as waste materials A total of 10 soil borings and 15 monitoring wells were installed as per the Work Plan. These activities generated a total of 143 drums of soil cuttings These drums are marked and staged on site. The well development activities produced several hundred gallons of groundwater which were delivered to the on site wastewater treatment plant for disposal.

The first of the two planned groundwater sampling events took place 12/13 through 12/15/94 with representatives of Clean Tech and Geotrans present on site. At that time all 15 wells were sampled for laboratory analysis. The wells were purged prior to sampling and the purged water was placed in drums and retained near each well.

As per our discussion this date, Clean Tech will proceed to deliver the purged groundwater collected during the first groundwater sampling round to Chrysler's on site wastewater treatment plant. The soil cuttings produced during the well installations will be placed on site at some suitable location near the Clean Tech soil bioremediation project currently underway

The geophysical logging of the on site production water well will not be performed. The purpose of logging the well was to determine the depth to the clay layer separating the water table aquifer and the underlying semi-confined aquifer This has now become unnecessary since the well installations have provided this information

Representatives of Clean Tech plan to be on site January 24, 1995 to collect a second round of water level measurements, and to collect the second round of groundwater samples beginning February 20, 1995.

Clean Tech has prepared the following schedule for submission of our draft report for the site investigation at the referenced facility. The report will be presented in sections as noted for your review and comments. A copy of our report outline is attached. The planned submittal dates and report sections to be submitted are:

January 27, 1995
Introduction, Soil Vapor Survey, Groundwater Analytical Results (Round #1)

February 17, 1995
Groundwater Monitoring Wells, Soil Borings, Soil Sampling and Analysis, Groundwater Sampling and Analysis, Soil Analytical Results, Geology

March 31, 1995
Water Level Measurements (includes Surveying Methods), Groundwater Analytical Results (Round #1 & #2), Hydrogeology, Contaminant Distribution, Interpretations of Contaminant Distribution, Wastes Disposal Methods, Recommendations

If you have any questions, please contact me at (302) 999-0924

Sincerely,

Steven W. Newsom, P G.
Principal Geologist
CLEAN TECH

e:\usr-data\steve\chrysler\schedrpt doc

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Site Investigation Report of Findings
Chrysler Corporation
Dayton Thermal Products Division
Proposed Outline

Section 1.0 - Introduction
Section 2.0 - Soil Vapor Survey
Section 3.0 - Soil Borings
Section 4 0 - Soil Sampling and Analysis
Section 5 0 - Groundwater Monitoring Wells
Section 6.0 - Groundwater Sampling and Analysis
Section 7.0 - Water Level Measurements
Section 7.1 - Method of Collection
Section 7 2 - Findings
Section 8 0 - Laboratory Results for Soil Samples
Section 9 0 - Laboratory Results for Groundwater Samples
Section 9 1 - Groundwater Sampling Round #1
Section 9 2 - Groundwater Sampling Round #2
Section 10 0 - Geology
Section 10 1 - Regional Geology
Section 10.2 - Site Geology
Section 11 0 - Hydrogeology
Section 11.1 - Regional Hydrogeology
Section 11.2 - Site Hydrogeology
Section 11 2.1 - Unconfined Aquifer
Section 11.2.2 - Upper Semi-Confined Aquifer
Section 11.2.3 - Vertical Flow Potential
Section 12 0 - Contaminant Distribution
Section 12.1- Soil Vapor Survey Contaminant Distribution
Section 12 1.1 - Shallow Soil Vapor Samples
Section 12.1.2 - Deep Soil Vapor Samples
Section 12.2 - Soil Contaminant Distribution
Section 12 3 - Groundwater Contaminant Distribution
Section 12.3 1 - Groundwater Sampling Round #1
Section 12.3 2 - Groundwater Sampling Round #2
Section 12.3 3 - Discussion of Groundwater Contaminant Distribution
Section 13.0 - Interpretations of Contaminant Distribution Patterns
Section 14.0 - Waste Disposal Methods
Section 15 0 - Recommendations
Section 15.1 - Summary of Findings
Section 15.3 - Remedial Options

MEMORANDUM

DATE: OCTOBER 4, 1994

TO: Curt Chapman

FROM: Deborah A. Buniski

RE: Site Investigation Activities at Dayton

CC: A. Aquwa

Curt:

As we discussed we will be arriving at the Dayton plant on Sunday-October 9, 1994. We will have employees from Clean Tech at the site on that day. The Geoprobe system will also mobilize on October 9, 1994 from Pittsburg, PA. The GC/mobile lab will be set up on October 9, 1994. The first full day of field activity will be October 10, 1994. The week of October 10-16 will consist of soil gas analysis. We have discussed the work plan and the need to locate utilities with Doug Orf. He has located all storm, gas, sanitary and fire supply lines on a map. He is attempting to also locate the electrical lines on a drawing. We have discussed our drilling and soil gas locations with Doug who is in agreement on the chosen locations. On October 17 we will mobilize two drill rigs to begin the soil boring program and the installation of the deep wells. At that time Geotrans will mobilze to the site. Geotrans will provide a geologist to oversee one drill rig and CT will provide another to supervise the second rig. During the soil gas and part of the soil boring program I will be on-site supervising activities. Once the drilling program is underway, our geologist-Steve Newsom-who is a professional geologist will supervise the activities. Once we have mobilized to the site we will contact you to keep you aware of our activities.

BID FORM

TO: Mr. Keith Coney, CIMS 484-00-04
DaimlerChrysler Corporation
Chrysler Technology Center
800 Chrysler Drive
Auburn Hills, Michigan 48326-2757

FOR: Sump/Sewer-Line/Separator Cleanout, Abandonment, and Disposal of Associated Solids and/or Liquids
DaimlerChrysler Corporation
Dayton Thermal Products Plant
Dayton, Ohio

The undersigned has carefully examined the Request for Bid for sump/sewer line cleanout, abandonment, and disposal of associated solids and/or liquids and other conditions relative to the work, and has made all evaluations and investigations necessary to gain a full understanding of pertinent site conditions and all regulatory, material, equipment, and labor requirements necessary to successfully and safely complete the work, as well as any reasonable difficulties which may be encountered in performing the work.

BID SCHEDULE

The undersigned hereby proposes and agrees to furnish all labor, materials, equipment, tools, permits, licenses, taxes, services and all other items necessary or appropriate for the proper and complete execution of the work for the following estimated amount:

Base Bid Estimate

All work:_____Dollars ($_____)

The undersigned agrees, if this proposal is accepted, to enter into an agreement with DaimlerChrysler Corporation, per DaimlerChrysler's Standard Terms and Conditions, for the above unit price-based, Contract Sum.

Unit Prices
This bid is based upon, and all work shall be performed in accordance with, the Unit Prices listed below. Should additions or subtractions to the scope of work be required, adjustment will be made to the Contract Sum at the following Unit Prices, which shall include all associated expenses, including taxes, overhead and profit.

UNIT PRICE TABLE

I.D.	DESCRIPTION	UNIT	EST. QTY	UNIT COST	TOTAL
A.	Mobilize and demobilize equipment and union work crew to/from Dayton, Ohio.	L S.	1		
B.	Concrete disposal at DaimlerChrysler-approved facility.	Per Ton	5		
C.	Sewer clean-out using appropriate technology to avoid a release of pipe contents into the subsurface.	L.F.	21,000		
D	Separator clean-out using appropriate technology.	L.S.	5		
E.	Site Restoration - Wire mesh reinforced concrete	yd^2	10		

F.	Site Restoration - asphalt (match same)	yd^2	10		
G.	Non-hazardous liquid waste transport and disposal at DaimlerChrysler-approved facility.	Per Gallon			
H.	Hazardous liquid waste transport and disposal at DaimlerChrysler-approved facility.	Per Gallon			
I.	Non-hazardous soil transport and disposal at DaimlerChrysler-approved facility.	Per Ton			
J.	Hazardous soil transport and disposal at DaimlerChrysler-approved facility.	Per Ton			
K	Sewer access, includes concrete cutting, removal, soil excavation, shoring as needed, boxwork, etc.	L.S.	12		
L.	Level C Personal Protection.	Per Man Per Day	0		
M.	Level B Personal Protection.	Per Man Per Day	0		
N.					
O.					
	TOTAL ESTIMATED BID				

L.S. = Lump Sum
L.F. = Linear Foot
yd^2 = Square Yard

NOTE: Bidder shall provide Unit Prices for all equipment/materials/services on Unit Price Table and shall provide a best-judgement estimate of expected quantities where no quantity is indicated.

PROJECT INITIATION

If awarded this contract, the undersigned bidder proposes and agrees to start work NO LATER THAN NOVEMBER 15, 1999.

PROJECT COMPLETION

If awarded this contract, the undersigned bidder agrees to complete the work NO LATER THAN JANUARY 2000.

ADDENDA RECEIVED (IF REQUIRED)

The undersigned hereby acknowledges receipt of the following Addenda, which shall become part of the Contract Documents:

Addendum Number 1 Dated_____ Addendum Number 2 Dated_____

The Contractor shall acknowledge any Bid Addenda received during the bid process by transferring the date of the Addenda to the appropriate line above and returning a signed copy of this form to DaimlerChrysler Corporation.

BID ACCEPTANCE

In submitting this proposal, it is understood that DaimlerChrysler Corporation reserves the right to reject any or all bids, waive any formalities or technicalities in any bid and to make an award in the best interest of DaimlerChrysler Corporation. It is further understood and agreed that this proposal may not be withdrawn for a period of sixty (60) calendar days after the date set for bid receipt.

Our company IS_____, IS NOT_____ a Certified Minority Business Enterprise (MBE) firm. If so, attach certification.

Respectfully Submitted:

_____

Contractor Firm

_____

Authorized Signature

_____

Name and Title (please print or type)

_____

Date

(_____)_____

Telephone Number

(_____)_____

Fax Number

_____

Email address

S \TECH\3CHRY\DAYTON\PROJMGMT\BIDS\BIDSEW99 FRM

Dayton Sewer Cleaning Pre-Bid Meeting and Site Walkover

10/21/99

Printed Name	Company	Phone #
..CUNNINGHAM	EQIS	734-677-8822
joe franklin	EQIS	419-353-1330
OB GREENWOOD	~~AQUATECH~~	734-~~2~~46-4464
ARRY BRYK	"	"
RT LAMB	K+D of Ohio	419 526 2411
d LONGSDORF	MPS	313-841-4555
Jim Schierloh	K&D	734-722-8922
Ken Liabenow	K&D	(734) 722-8922
ourtland Colding	MPS GROUP	(313) 841-7588
ike Webb	Onyx	(937) 237-1097
ARVIN MERRIGADER	DAIMLER CHRYSLER	(937) 224-3405
en Vogel	LBG	(651) 490-1405 ext. 202
ary Stanczuk	DC	248-576-7365
KEITH CONEY	D/CHRYSLER	(248) 512-1654

MEETING AGENDA
DAYTON THERMAL PRODUCTS PLANT
September 8, 1999
11:00 to 1:00

1) Sewer Cleaning
- target inactive lines in former "source" areas
- access to operational plant areas
- cleaning water storage/disposal/treatment
- schedule and timing
- potential hurdles to implementing
- plant/corporate health/safety/noise requirements
- abandonment/plugging procedures/requirements

- We agreed to Pay (Not Directly yet)
- They need to help also with $
- We will be holding Bid
- Like to start by Mid Above (May not start till Spring)

2) Nocolock System Installation
- locations
- schedule and timing
- pre-construction soil sampling
- access to operational plant areas
- potential hurdles to implementing

3) SVE/Source Area Remediation
- buildings 3A, 40, 40A, 50, 53, 59
-

See Will need Depth of sewers

4) Free Product Recovery-Bldg. 40B
- location
- plant air supply
- recovered product to waste oil sump
- timing and schedule
- possible source(s)

5) Offsite Ground-Water Quality
- Geoprobe results
- monitoring well installation
- public relations
- permits/access

LBG will get list of Data & Mix of Power Probes

Bwldg. 40 next Spring about 1 year

Bwld 59 Docks North side.

DAIMLERCHRYSLER CORPORATION
DAYTON THERMAL PRODUCTS PLANT
POTENTIAL SEWER CLEANING CONTRACTORS

Smith Remediation Technologies
(no-bid on Bldg. 40B sewers)
913 West Holmes, Suite 275
Lansing, MI 48910-0411
(517) 393-2792
(517) 881-9721 mobile phone
Contact: Billy Smith
MBE

TESA U.S.A.
207 East Ohio: PMB 378
Chicago, IL 60611
(312) 951-5195
(312) 951-5196 FAX
Contact: Reginald Waters
MBE

Alpha-Omega Environmental Company
(no-bid on Bldg. 40B sewers)
600 Renaissance Center, Suite 1920
Detroit, MI 48243-1801
(313) 259-3720
Contact: Marshall Bates
MBE

Waiting for return call

Clean Harbors Environmental Services, Inc. *(no-bid on Bldg. 40B sewers)*
4879 Spring Grove Avenue
Cincinnati, OH 45232
(800) 805-4582
Contact: Brian Ludwig

Waiting for return call

Visu-Sewer Clean & Seal Company
(have worked for DuPont and 3M)
W230N4855 Betker Road
Pewaukee, WI 53072
(414) 695-2340
(414) 695-2359 FAX
Contact: Ernie Alexander

K&D Environmental & Industrial, Inc.
(have worked for both DaimlerChrysler & GM)
270 9th Avenue
Mansfield, OH 44905
(419) 526-2411
(419) 524-4345 FAX
Contact: Bill Burns

MPS Group

Onyx Industrial Services, Inc.
(formerly Waste Management Industrial Services)
6151 Executive Boulevard
Huber Heights, OH 45424
(937) 237-1097
(937) 237-1850 FAX
Contact: Mike Webb

EQ Industrial Services
(bought Hi-Po, Inc., who bid on Bldg. 40B)
3650 Carpenter Road
Ypsilanti, MI 48197
(734) 677-88822
(734) 677-8844 FAX
Contact: Tom Handyside

Environmental Management Company (ENMANCO)
42826 North Walnut
Mt. Clemens, MI 48043
(810) 468-4320
(810) 468-8541 FAX
Contact: Steve Howard

Aqua-Tech Environmental, Inc.
25105 Brest Road
Taylor, MI 48180
(734) 946-4464
(734) 946-7345 FAX
(734) 216-4559 mobile phone
Contact: Jim Leonard

Advanced Sewer Technology, Inc.
9337 Seward Road
Fairfield, OH 45014
(513) 942-0555
(513) 942-4323 FAX
Contact: Grant Fritzsche

recom by LJB
Not union but can be made it

Philip Services Corporation
(awarded Bldg. 40B sewer cleaning; contract partnership w/MPS)
2017 Valley Street
Dayton, OH 45404
(800) 819-7923
(937) 233-8911
(937) 233-3347 FAX
Contact: Don Potter

Not MBE Now

S:\TECH\3CHRY\DAYTON\PROJMGMT\BIDS\SEW99BID1.S1
September 1, 1999

LEGGETTE, BRASHEARS & GRAHAM, INC.

REQUEST FOR BID
JOB SPECIFICATION
SEWER AND SEPARATOR CLEANING AND ABANDONMENT

Dayton Thermal Products Plant

Dayton, Ohio

October 1999

DAIMLERCHRYSLER CORPORATION
800 Chrysler Drive
Auburn Hills, Michigan 48326

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(continued)

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(continued)

PLATE
(at end of Request for Bid document)

Plate

1 Sewer Cleanout Map

R.F.Q. 3CHRY4
DATE: October 14, 1999

REQUEST FOR BID - JOB SPECIFICATION
SEWER AND SEPARATOR CLEANING AND ABANDONMENT

JOB NAME:	Sump/Sewer Line/Separator Clean out, Abandonment, and Disposal of Associated Solids and/or Liquids
JOB LOCATION:	DaimlerChrysler Dayton Thermal Products Plant/Buildings
DRAWING OR SKETCH NUMBER:	DaimlerChrysler/Dayton Plant Sewer Layout (Plate 1)
ATTACHMENTS:	BID FORM

1.0 INVITATION TO BID

Your firm is hereby requested to submit a proposal for performing the complete work as described in the Contract Documents consisting of these specifications, the bid form, and included drawings and sketches.

Information regarding existing conditions at the job site are believed to be reasonably correct, but the Owner cannot guarantee its completeness or accuracy. The Contractor will be held to have examined the Contract Documents, the premises and the job site and to have satisfied himself as to the scope of work and field conditions before the delivery of his proposal.

1.1) Bids and Prices

Contractor's base bid must be in accordance with the Specifications. Contractor may, at its option, offer alternate bids in addition to the base bid. Each alternate bid must be clearly identified as an alternate and must identify all exceptions taken to the Specifications, listing each item separately and the reason for the exception. Contractor must submit to DaimlerChrysler's Procurement & Supply Department any alternate price, unit price and separate price that DaimlerChrysler may require. All prices quoted will be firm and with no provision for escalation, unless otherwise specified in writing when the Contract is awarded. Prices must include all applicable taxes.

When the Specifications provide for a specific item or its equal, Contractor must calculate the price of the make or type specified. If Contractor prefers to use a substitute material or method that Contractor believes to be of equal or greater value than the specified item, Contractor must state in its bid proposal the price difference to be added to or deducted from the bid price if the specified item were replaced by the substitute. If substitute materials include regulated substances, Contractor must submit a completed "Supplier Regulated Substances Certification Report" to DaimlerChrysler.

If a choice of more than one make or type of article or material is specified and Contractor requires an adjustment in the bid price because of the alternatives specified, Contractor must state in its bid proposal the make or type upon which the bid proposal is based and the amount to be added to or deducted from the bid price if other makes or types named in the Specifications are selected. If that type of statement is not in Contractor's proposal, DaimlerChrysler may select any specified make or type without incurring a change in the price. In any event, whenever DaimlerChrysler has a choice of alternate materials, the final selection is DaimlerChrysler's.

DaimlerChrysler may accept or reject any proposal or parts thereof and may award the Project to someone other than the low bidder. All proposals must remain in effect for at least thirty days after the bid date.

2.0 INSTRUCTIONS TO BIDDERS

BIDDERS' MEETING:	10.00 a.m., October 21, 1999 DaimlerChrysler/Dayton Thermal Products Division Plant Engineering Office 1600 Webster Street Dayton, Ohio 45404
BIDS DUE:	4:00 p.m., CST, November 1, 1999
CONTRACT AWARD:	November 5, 1999

FIELD INSTALLATION: November 15, 1999
JOB COMPLETION: January 2000

Inquires regarding these bid specifications and request for plant visits are to be directed to:

Mr. Kenneth D. Vogel, Senior Associate
Leggette, Brashears & Graham, Inc.
1210 West County Road E, Suite 700
St. Paul, MN 55112
TELEPHONE: (651) 490-1405, ext. 202
FAX: (651) 490-1006
E-MAIL: kvogel@lbgmn.com

Send four (4) copies of written work plan and completed bid form to the attention of Mr. Keith Coney:

Mr. Keith A. Coney, CIMS 484-00-04
DaimlerChrysler Corporation
Chrysler Technology Center
800 Chrysler Drive
Auburn Hills, Michigan 48326-2757
TELEPHONE: (248) 512-1654
FAX: (248) 512-1521

In addition, send one (1) copy of written work plan and completed bid forms to the attention of each of the following individuals:

Mr. Kenneth D. Vogel, Senior Associate
Leggette, Brashears & Graham, Inc.
1210 West County Road E, Suite 700
St. Paul, MN 55112
TELEPHONE: (651) 490-1405, ext. 202
FAX: (651) 490-1006
E-MAIL: kvogel@lbgmn.com

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Mr. Gary M Stanczuk, CIMS 482-00-51
DaimlerChrysler Corporation
Chrysler Technology Center
800 Chrysler Drive
Auburn Hills, Michigan 48326-2757
TELEPHONE: (248) 576-7365
FAX: (248) 576-7369

The following local contractors are familiar with the plant facilities and operations. These firms are noted for informational purposes only. Inclusion or exclusion of these firms in your bid will not have a bearing on award of the work.

Fryman-Kuck	(concrete, iron work, etc.)	(937) 274-2892
Shook, Inc.	(concrete, iron work, etc.)	(937) 276-6666
S&D Mechanical	(plumbing)	(937) 277-8080
Pipe Systems, Inc.	(plumbing)	(937) 236-2262
Freedom Electric	(electrical)	(937) 228-0660
Studebaker Electric	(electrical)	(937) 890-9510
Browning-Ferris Industries	(waste disposal)	(513) 771-4200
Waste Management, Inc.	(waste disposal)	(937) 592-8080

3.0 SCOPE OF WORK

THE SUCCESSFUL BIDDER WILL FURNISH ALL SERVICES, TRADE-SPECIFIC UNION LABOR SIGNATORY TO THE NATIONAL MAINTENANCE AGREEMENT, MATERIAL, EQUIPMENT, TAXES, PERMITS, TOOLS AND SUPERVISION TO DO ALL OF THE FOLLOWING:

3.1) Job Name: Sump/Sewer Pipe/Separator Clean out and Disposal of Associated Solids and/or Liquids

3.2) General Requirements

The Scope of Work for this project involves cleaning, removal, draining, sampling, storage, transportation, and proper disposal of liquid and solid contents from, and abandonment of, storm sewer pipes, associated floor drain piping, former process lines, and separators located beneath Buildings 3A, 40, 40A, 50, 52, 53, and 59 (Plate 1). Contractor shall furnish all trade-specific union labor, materials, taxes, and equipment required to drain, clean, and properly abandon and seal the sewer pipes, process lines, floor drains, and separators. The work shall include, but not be limited to, all mobilization/ demobilization; concrete cutting; bypass pumping/flow control; traffic control; root removal; debris removal, storage and disposal; waste removal, storage and disposal; decontamination; concrete replacement; floor sealing; site restorations; permitting; field log; video equipment, and all incidentals necessary to complete the work as described in these Specifications. The site shall be restored to original conditions or better. The work shall be coordinated with LBG and plant personnel and completed in accordance with the Contract Work Schedule.

All inactive sewer pipes, process lines, floor drains and separators shall be cleaned of all fluids, sediments, and original contents using suitable means and equipment to be recommended by the contractor and approved by the Owner. Some or all of the sewer pipes may be old and fragile, and the utmost care needs to be taken so that clean-out operations do not cause the release of the sewer contents into the subsurface.

Every precaution shall be taken to minimize disruption to current plant operations. Fugitive dust, noise and/or vapor emissions shall be minimized and contained within the work area.

The Contractor shall conduct all operations in strict accordance with health and safety requirements imposed by OSHA, other pertinent governmental agencies, and the Owner. It is solely the Contractor's responsibility to follow all applicable health and safety codes and regulations governing this work. Contractor shall perform the work in accordance with the requirements of all standards, codes, regulations, and recommended practices as detailed in this Specification. In the event of conflict, the more stringent standard, code, regulation, or recommended practice shall govern.

The Contractor shall remove all debris and waste from the Owner's property and dispose of according to local, state, federal, and plant regulations. **All concrete, soil, liquid and solid waste, and other debris requires Owner's approval before removing from plant property and may only be treated, disposed of or recycled at an Owner-approved facility.**

3.3) Background

Sewers beneath Building 40B were cleaned in July 1998. A 1967 plant utility map shows six storm sewer pipes located under Building 40B (Plate 1). The pipes have been labeled B, C, D, E, F, and G from west to east. The age of all six pipes, their designated use, and the date they were last used is unknown. Three clay sewer pipes, (D, E, F) 8 to 12 inches in diameter, were encountered at approximately 3 feet below grade level while digging press foundations in Building 40B at the facility. Pipe "D" was an 8 to 12-inch red clay pipe. The contents of the pipe were described from samples as an oil-water mixture. The samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), RCRA metals, pesticides, PCBs, reactivity, and pH. Only lead and trichloroethene were above the EPA hazardous limits Some liquid in the pipe was removed by vac truck and the ends of the pipe were sealed with cement. Pipe "E" was a 10 to 12 -inch red clay pipe. The contents of the pipe were described as black, tarry silt, sand and gravel filling approximately ½ the diameter of the pipe. Pipe "F" was also a 10 to 12 -inch red clay pipe. The contents of this pipe were described as a beige, creamy looking substance overlaying gray sand and gravel filling approximately ½ the diameter of the pipe. The chemical contents of pipes "E" and "F" were unknown.

The condition, size, and contents of the remaining pipes to be cleaned at the facility are unknown. Similarly, the size, condition, and construction of separators and sumps is also unknown

3.4) Products

Contractor shall mark up one set of Sewer Cleanout Map, showing any corrections to sewer segment's location, size, pipe material, and/or pipe length. The marked up Sewer Cleanout Map shall become record documents, and shall be delivered to DaimlerChrysler upon completion of the work.

3.5) Execution

If the sewer line(s) is/are found to be non-accessible, Contractor shall record such information on the Sewer Cleanout Map ("Red Line" Drawings) maintained at the site, and inform DaimlerChrysler's Representative.

Satisfactory precautions shall be taken to protect all structures and appurtenances from damage that might be inflicted upon them by the improper use of cleaning equipment. Any damage inflected by the improper use of the cleaning equipment, regardless of the cleaning method used, shall be repaired by Contractor at no additional cost to DaimlerChrysler.

3.6) Damage Prevention During Cleaning Operation

Contractor shall recognize that there are some conditions such as broken pipe and major blockages that prevent cleaning from being accomplished or where damage would result if cleaning were attempted or continued. Should such conditions be encountered, Contractor shall immediately notify the Owner and/or Owner's Representative. Immediate notification shall also be provided should any conditions warrant termination of cleaning activities.

3.7) Cleaning Operations Work Plan and Schedule

The Contractor's proposal shall include a written, detailed work plan and detailed schedule, which completely and thoroughly describes the proposed method of sewer entry, proposed cleaning and abandonment methods, capture of pipe contents, storage of pipe contents, disposal of pipe contents, equipment to be used, and site restoration methods, as well as all other activities required for successful completion of the work. Four copies of the proposal shall be submitted to Mr. Keith Coney and is subject to the approval of DaimlerChrysler Corporation

3.8) Plant Utilities

1.	Electrical Power	460 Volts/3-Phase/60 Hz.
2.	Compressed Air	60 PSI
3.	Water (City)	50 PSI at 55° Fahrenheit
4.	Natural Gas	5-7 PSIG, 1020 BTU per Cubic Foot
5.	Steam	150 PSI (reduced to 35 PSI by Vendor)

3.9) Installation Site, Building Limitations

Building 40B has a clear height of 17 feet from the floor to the bottom of the trusses. The bottom of roof deck to the floor is 23 feet. Vendor will be responsible for field measuring the work areas to ensure clearance required for the completion of required work. Vendor will also be required to review the plant to determine best entry into the buildings and/or the sewers and design equipment accordingly.

3.10) Insurance and Codes

All work furnished shall be in compliance with all local, State and Federal Codes and Regulations.

All work shall comply in every respect with current Federal Occupational Safety and Health Act (OSHA). Compliance with DaimlerChrysler Corporation Underwriters (I.R.I.) is required.

All work and/or materials used or provided for the specified work shall comply with all of the following:

A. Industrial Risk Insurers Requirements
B. OSHA Health and Safety Act
C. Montgomery County Regulations
D. City of Dayton Fire Safety Requirements
E. City of Dayton Water Department Requirements
F. DaimlerChrysler Corporate Plant Construction Codes and Standards
G. DaimlerChrysler/Dayton Controls Specifications
H. JIC Electrical Standards (EMP-1-1967)
I. Insurance Underwriters Standards
J. Walsh-Healy Act

K. DaimlerChrysler's Specification for noise Control of Equipment dated 1982.
L. Environmental Protection Agency Rules and Regulations (EPA)
M. DaimlerChrysler's Electrical Standards
N. DaimlerChrysler's Pneumatic Standards (P-1-1975)
O. DaimlerChrysler's Hydraulic Standards (H-101973)
P. DaimlerChrysler's Lubrication Standards
Q. DaimlerChrysler's Motor Standards (NPEY-100)
R. DaimlerChrysler's Color Standards (CS 25, 7-76)
S. DaimlerChrysler's Safety Standards

The Prime Contractor will be held totally responsible for the cleaning and abandonment techniques, materials used, permits, warranties and adherence to all the nineteen (19) additional regulatory agencies or standards set forth within this set of specifications.

All other questions relating to the quote documents, its language, deadlines and/or other general information should be directed to Mr. Keith Coney.

4.0 GENERAL CONDITIONS, PERFORMANCE, AND MATERIALS

4.1)

1. Definitions

"Additional Contract Documents" means the documents, if any, which are so designated in DaimlerChrysler's purchase order issued to Contractor for the Project.

"DaimlerChrysler" means DaimlerChrysler Corporation unless the purchase order for the Project is issued in the name of a DaimlerChrysler Corporation subsidiary, in which case "DaimlerChrysler" means that subsidiary.

"Contract" means the legal contract, as amended by Modifications, between Contractor and DaimlerChrysler formed by (1) these general terms and conditions, (2) the terms of DaimlerChrysler's purchase order (including the clauses referenced in the order and its general terms and conditions), (3) the Specifications, (4) the Drawings, and (5) any Additional Contract Documents.

"Contract Documents" means DaimlerChrysler's purchase order, this document, the Specifications, the Drawings, any Additional Contract Documents identified as such in the purchase order, any Modifications issued after execution of the Contract.

"Drawings" means the drawings for Project prepared by or for DaimlerChrysler and signed by DaimlerChrysler's authorized representative, and includes any subsequent modifications or substitutions approved and signed by DaimlerChrysler's authorized representative.

"Modification" means (1) a change made in accordance with Section 4.41 below or (2) a written amendment to the Contract signed by both parties.

"Project" means the construction and services required to be provided to DaimlerChrysler by Contractor under the Contract, whether partially or fully completed, and includes all services, labor, equipment and materials provided or to be provided by Contractor to fulfill its obligations under the Contract.

"Specifications" means the written requirements and standards for materials, equipment, systems, workmanship, and services made applicable to the project by DaimlerChrysler.

2. Order of Precedence

In the event of direct conflict between terms in different Contract Documents, terms contained in the document enumerated under the definition of "Contract" above the lowest number shall control.

3. Survey and Legal Description

DaimlerChrysler will furnish Contractor with a legal description and a survey of the job site showing lot lines and permanent benchmarks. Any other line or level necessary for location or performance of the Project must be established and maintained by a competent surveyor hired and paid for by Contractor.

4. Examination and Investigation by Contractor

Contractor acknowledges and represents to DaimlerChrysler that it has, prior to entering into the Contract, carefully examined all Contract Documents, has made adequate investigation of and become familiar

with the conditions of the job site, other construction activities existing or planned on or adjacent to the job site, the work required to be performed under the Contract, and the materials needed to complete the Project, and has correlated its observations and other information available to it with the requirements of the Contract Documents. Before commencing construction activities, Contractor must take field measurements and verify field conditions and carefully compare such field measurements and conditions and other information available to Contractor with the Contract Documents. Contractor will be solely responsible for all costs incurred as a result of any failure by Contractor to comply with its obligations under this Section, any error or oversight on its part, or any interference by DaimlerChrysler's or other contractors' reasonable activities.

Contractor will immediately report to DaimlerChrysler any errors, inconsistencies or omissions discovered in the Contract Documents. DaimlerChrysler's interpretation of the Specifications and Drawings, or of any inconsistencies between or within them, shall be final and binding upon DaimlerChrysler and Contractor. Contractor will not avail itself of any manifest errors or omissions in the Contract Documents.

5. Performance Bond

If requested by DaimlerChrysler, Contractor must secure a performance bond, the cost of which will be borne by DaimlerChrysler, in the full amount of the purchase order price with a surety acceptable to DaimlerChrysler. DaimlerChrysler's obligations under the Contract are contingent upon Contractor securing such performance bond.

4.2) Laws, Ordinances, and Regulations

The Contractor shall in performance of the contract comply with all applicable Federal, State (Ohio) and Local laws (Dayton, Montgomery County). These shall include adherence to the intent of DaimlerChrysler/Dayton Thermal Products Division Plant Protection and Fire Protection regulations. The design concepts of the systems shall comply with the requirements of the DaimlerChrysler Fire Insurance Carriers, Factory Mutual and Factory Insurance Association and OSHA.

4.3) Insurance

DaimlerChrysler will assume responsibility for maintaining fire and extended coverage insurance to cover the work performed and materials delivered to the job site which are to be included in the permanent construction, whether or not installed, except as otherwise provided in the next paragraph of this Section. Contractor shall not be liable for loss or damage to such work or materials caused by fire or other perils normally insured against by standard fire and extended coverage insurance policies, and the policy or policies maintained to cover such values will include (without specifically naming any party other than DaimlerChrysler in said policies) any interests of Contractor and its subcontractors in such work performed and material delivered. DaimlerChrysler waives any right of recovery it may have against the Contractor and subcontractors for damage to or destruction of the above property and of other property of DaimlerChrysler located at the construction location due to fire or extended coverage peril. Loss, if any, to such work or materials shall be payable to DaimlerChrysler. Contractor shall be responsible for any and all loss of materials connected with the construction due to unexplainable disappearances, thefts or misappropriations of any kind or nature.

The foregoing provisions shall not operate to relieve Contractor and its subcontractors of responsibility for any loss or damage to their own or rented property or property of their employees of whatever kind or nature, nor to labor performed under the Contract incident to the repair, replacement, salvage, or restoration of such items, including, but not limited to, tools, equipment, forms, scaffolding, and temporary structures, including their contents. DaimlerChrysler shall in no event be liable for any loss or damage to any of the aforementioned items, the work connected with the aforementioned items, or any other property of Contractor, its subcontractors or their employees or agents, which is not to be included in the permanent construction. Contractor and its subcontractors hereby waive any rights of recovery they may have against DaimlerChrysler for damage or destruction of their own property or property of their employees of whatever kind or nature.

Contractor and each of its subcontractors must, during the continuance of the Project, including any additional work in connection therewith, maintain the following insurance coverages:

(a) workers' compensation, employers' liability insurance, and any insurance required by any employee benefit act or other statute applicable where the work is to be performed. All insurance must be in amounts sufficient, in the opinion of DaimlerChrysler, to protect Contractor and subcontractors from any liability for bodily injury, sickness or disease (including death resulting at any time from the injury, sickness or disease) of any of their employees, including any liability or damage which may arise by virtue of any statute or law in force or which may hereafter be enacted;

(b) comprehensive general liability and property damage insurance in any amount required by DaimlerChrysler, but not less than $5,000,000 combined single limit, bodily injury and property damage, as protection against all risks of damage to or destruction of property, including loss of its use, or bodily injury, sickness, or disease (including death resulting at any time from the injury, sickness or disease) of persons, wherever located, resulting from any action, omission or operation under the Contract or in connection with the work; and

(c) comprehensive automobile liability insurance, including property damage, covering all motor vehicles used in connection with the work, in the minimum amount of $5,000,000 per person, $5,000,000 per occurrence for bodily injury (including death resulting at any time from the injury) and $5,000,000 per occurrence for property damage.

Each insurance policy required by the Contract must be issued by a company authorized to do business under the laws of the state or province in which the work is to be performed. The policy must name DaimlerChrysler as an additional insured and contain endorsements stating that it is primary and not excess over or contributory with any other valid, applicable and collectable insurance in force for DaimlerChrysler. The policy must also contain appropriate endorsements extending the coverage to include the liability assumed by Contractor under the Contract. Each insurance policy procured must provide that no material change or cancellation in insurance may be made by Contractor or a subcontractor without thirty days prior written notice to DaimlerChrysler and DaimlerChrysler's written approval of the change or cancellation. DaimlerChrysler may, at its option, require Contractor to furnish evidence of the above described insurance. Contractor's failure to comply with these insurance requirements does not relieve Contractor of its liability and obligations under this Section, and DaimlerChrysler's action or inaction with respect to insurance certificates does not act as a waiver of any DaimlerChrysler right described in this Section.

4.4) Assumption of Risk

For purposes of this Section and the next Section, "Property Damage" means damage to or destruction of property and the loss of use thereof, and "Personal Injury" means bodily injury, sickness or disease, including death resulting at any time from the injury, sickness or disease.

Except as specifically provided with respect to damage of property in the first paragraph of Section 4.3, Contractor assumes all risk of Property Damage and of Personal Injury on or in connection with the Project, and of any claim resulting from or arising out of any action, omission or operation under the Contract or in connection with the Project. Contractor will bear the risk of loss or damage to the Project until DaimlerChrysler accepts the completed Project. Contractor will repair and replace at its own expense all such loss and damage, however caused, whether or not due to the fault of Contractor.

4.5) Indemnity

Contractor must defend, indemnify and hold DaimlerChrysler harmless from any loss, cost, damage, liability, expense, claim, administrative or legal action, whether groundless or not, arising out of or in connection with any Personal Injury or any Property Damage arising out of or related to performance of the Contract, including any extra work assigned to Contractor in connection with the Project, based upon any act or omission, negligent or otherwise, of (a) Contractor or any of its employees, agents, or servants, (b) any subcontractor of Contractor or any employees, agents, or servants of the subcontractor, or (c) any other person or persons, including DaimlerChrysler, or any employees, agents or servants of DaimlerChrysler. This indemnification includes, but is not limited to the obligation of Contractor to defend, indemnify and hold DaimlerChrysler harmless from any claim for Property Damage or Personal Injury based upon or alleged to have arisen out of: (1) the sole active or passive negligence of DaimlerChrysler (except as prohibited by Michigan Complied Laws Annotated Sec. 691.991, (2) the joint or concurrent active or passive negligence of DaimlerChrysler and Contractor, (3) the joint or concurrent active or passive negligence of DaimlerChrysler and any subcontractor of Contractor, (4) the joint or concurrent active or passive negligence of DaimlerChrysler and any other person(s) , (5) the joint or concurrent active or passive negligence of Contractor and any other person(s), (6) the joint or concurrent active or passive negligence of any subcontractor of contractor and any other person(s), (7) DaimlerChrysler's failure to provide a safe place to work, or (8) DaimlerChrysler's failure to take proper or reasonable safety precautions or exercise proper control with respect to the conduct of any inherently dangerous activity on or off its premises.

If the Project is to be performed in the State of Illinois or if Illinois law would apply to the Contract, the following indemnity paragraph is substituted for the immediately preceding paragraph: "Contractor must, defend, indemnify, and hold DaimlerChrysler harmless from and against any loss, cost, damage, expense, claim, or legal action, whether groundless or not, arising out of the bodily injury, sickness, or disease (including death resulting at any time therefrom) which may be sustained or claimed by any person, and the damage or destruction of any property, including

loss of its use, arising out of or related to the performance of any work in connection with this Contract, based upon any act or omission, negligent or otherwise, of (a) Contractor or any of its employees, agents, or servants, (b) any subcontractor of Contractor or any of its employees, agents or servants, or (c) any other person or persons excluding agents, servants, and employees of DaimlerChrysler."

Contractor must, at its own expense, defend against any claim of Property Damage or Personal Injury and any suit, action or proceeding which may be commenced relating to such claim, and Contractor must pay any judgment which may be recovered in the suit, action or proceeding and all expenses, including not limited to, costs, attorneys' fees, and settlement expenses which may be incurred in the suit, action or proceeding.

4.6) Permits

All permits shall be obtained and all inspection fees shall be paid for by the Contractor for all work requiring such.

4.7) Union Labor

Contractor shall provide trade-specific union labor, signatory to the terms of the National Maintenance Agreement, the local collective bargaining agreement, and/or as required by the Owner.

4.8) Subcontractors

Contractor may not subcontract under or assign the Contract or any part thereof without the prior express written approval by DaimlerChrysler. In any subcontracting hereunder, Contractor must by written agreement require each subcontractor to assume toward Contractor, to the extent of subcontractor's work on the Project, all obligations and responsibilities which Contractor, by the Contract, assumes toward DaimlerChrysler. Each subcontract must preserve and protect the rights of DaimlerChrysler under the contract Documents with respect to the work to be performed by the subcontractor so that the subcontracting will not prejudice such rights. Contractor shall require each subcontractor to enter into similar written agreements with its subcontractors.

Notwithstanding any approval or consent given by DaimlerChrysler, Contractor is responsible to DaimlerChrysler for the acts, omissions and performance of Contractor's employees, its subcontractors, their agents and employees, and any other persons or entities and their agents or employees performing any portion of the Project under contract with Contractor.

Nothing in the Contract shall be deemed to create a direct contractual relationship between DaimlerChrysler and any subcontractor of Contractor.

4.9) Minority Business Enterprise

Bidders are encouraged to include Minority Business Enterprise (MBE) firms for subcontracted services and/or supplies, when possible. Such MBE firms must be certified by an Owner-approved state or national MBE certification entity. Bidder shall identify any such proposed MBE sub-contractors in their bid.

4.10) Independent Contractor

Contractor's relationship to DaimlerChrysler is that of an independent contractor. Nothing in the Contract shall be deemed to make Contractor an agent, employee, representative, partner or joint venturer of DaimlerChrysler or to give Contractor authority to assume or create an obligation on behalf of, or in the name of, DaimlerChrysler.

4.11) Contractor's Obligations

Unless otherwise provided in the Contract, Contractor will provide, be responsible for, and pay for all labor, materials, equipment, construction machinery, tools, heat, water, utilities, transportation, and other services and facilities used to properly complete the Project in accordance with the Contract Documents. Contractor will pay all taxes, contributions and premiums payable under federal, state and local laws measured upon the payroll of employees engaged in the Project and will hold DaimlerChrysler harmless form liability for any such taxes, contributions and premiums.

Contractor will timely secure and pay for all permits, licenses and inspections and give all notices required by, and will fully comply with, all laws, ordinances, rules, regulations and lawful orders of proper public authorities in connection with the execution and completion of the Project. At the request of DaimlerChrysler and without additional charge, Contractor will (a) prepare and record with the appropriate register of deeds a notice of commencement for the Project, naming Contractor as both the owner's designee and the contractor and (b) supply a copy of the notice of

commencement to DaimlerChrysler and to all subcontractors and suppliers of labor and materials for the Project who requests it. Contractor will keep track of all notices of furnishing supplied by contractors and subcontractors for work performed on the Project.

Contractor will pay all sales, use, excise, transportation, privilege, occupational and other taxes applicable to the Project or to supplies or materials furnished thereto, and will hold DaimlerChrysler harmless from liability for any such taxes.

Contractor will employ a superintendent and, as necessary, designated assistants who will be present and maintain competent superintendence on the job site when work is in progress. Contractor will promptly remove from the Project any employee of Contractor or of its subcontractors whose presence DaimlerChrysler deems disruptive or detrimental to the progress of the Project.

Contractor will cooperate with and upon request render assistance to DaimlerChrysler, including participating in meetings called by DaimlerChrysler's representatives and furnishing DaimlerChrysler with levels and measurements on the job site.

Contractor will be responsible for all cutting, fitting and patching required to complete the Project or to make its parts fit together properly. Contractor will complete all connections between equipment and services supplied by DaimlerChrysler.

Contractor is responsible for handling, storing, removing and disposing of any non-hazardous, hazardous or potentially hazardous waste or material located on or near the job site and for complying with all applicable environmental laws, regulations, rules and ordinances. Contractor must prevent environmental contamination and is responsible for cleaning all oil, water or air contaminated by Contractor, its subcontractors or their activities. Contractor will indemnify and hold DaimlerChrysler harmless from any loss, cost, fine, penalty, liability, administrative action or damage award resulting from or in connection with any failure to fully comply with the provisions of this paragraph.

Contractor will defend, indemnify and hold DaimlerChrysler harmless from all losses, damages, liabilities, costs and expenses, including attorneys' fees, arising out of or resulting from any claim of infringement of patent, copyright, trademark, design right or any other intellectual property right, or of misappropriation of trade secret, by reason of work performed, materials used or equipment furnished by Contractor or its subcontractors. Contractor will pay all royalties and license fees necessary for DaimlerChrysler to have full and free use and enjoyment of the Project during construction and thereafter.

4.12) Use Of Premises and Job Site

Work hours shall be limited to no earlier than 6:30 a.m., Monday through Friday. If completion of the work by the specified completion date requires modification of these work hours, Contractor shall indicate any proposed changes in his bid submittal.

The Contractor shall confine their equipment, storage of materials, and the operations of their workmen to limits indicated by law, ordinances, permits and directions of the Owner. The Contractor shall enforce the Owner's instructions regarding signs, advertisements, fires and smoking. Smoking on the premises will be permitted only in areas where the Owner's regulations do not forbid the same.

The Contractor and all Sub-Contractors and their employees shall be subject to and at all times conform to the Owner's rules and requirements for the protection of the plant, materials, equipment and Owner's employees.

4.13) Job Site

Contractor will not unreasonably encumber the job site with materials or equipment and will confine its equipment, materials storage and the operation of its workmen within such areas as DaimlerChrysler may indicate from time to time. Contractor will, at no cost to DaimlerChrysler, move, as directed by DaimlerChrysler, material or equipment temporarily placed on the job site when necessary for performance for the Project. Contractor must not load or permit any part of a structure to be loaded with a weight that will endanger its safety.

Contractor will keep the job site and surrounding areas free from accumulation of waste materials or rubbish caused by operations under the Contract. Contractor will upon completion of the Project leave all buildings broom clean and remove from and around the job site waste materials, rubbish, tools, construction equipment, machinery and surplus materials. If Contractor fails to clean up, DaimlerChrysler may do so at Contractor's expense.

Contractor will afford DaimlerChrysler and DaimlerChrysler's other contractors, if any, reasonable opportunity for introducing and storing their materials and equipment and for performing their activities on the job site. Contractor will carry on its work so as not to unduly hinder, delay or interfere with their progress Contractor will perform any cutting and altering of, and fitting to, its work to make possible other work, including that of trades not covered by the Contract, as indicated on the Drawings even though not specifically stated in the Contract Documents.

Contractor and its subcontractors will not disconnect, remove, connect, change or otherwise alter in any way any pipelines, sewers, conduits, cables or other utilities located on DaimlerChrysler's premises without the specific, prior written approval of DaimlerChrysler.

Contractor will not store or use dynamite or other explosives on DaimlerChrysler's property without the express prior written approval by DaimlerChrysler.

If required by DaimlerChrysler, Contractor will furnish its employees and those of its subcontractors with a badge or a card, acceptable to DaimlerChrysler, which will identify them as employees of Contractor or its subcontractors, respectively, and admit them to the job site.

4.14) Timing

Time is of the essence of the Contract. Contractor will expeditiously complete the Project within the time limit(s) set forth in the Contract Documents. If it becomes necessary for Contractor to work other than regular hours, or to hire additional employees, to complete the Project on time, Contractor must give notice to DaimlerChrysler and work overtime, additional shifts, Sundays or holidays, or hire additional employees, as may be required, without additional cost to DaimlerChrysler.

Contractor will, when requested by DaimlerChrysler in writing at any time, work its forces outside the normal workday or workweek. If the contract price is based on normal workday or workweek, DaimlerChrysler will reimburse Contractor for its out-of-pocket overtime and premium payments, taxes, and welfare payments required by legal or union regulations, but is not responsible for other additional costs or fees. For all overtime and premium time charges chargeable to DaimlerChrysler, Contractor shall prepare and submit to DaimlerChrysler daily a complete list of its and its subcontractors' employees showing the hours worked.

Contractor will without cost to DaimlerChrysler cease work on any particular part of the Project and transfer its workmen to and execute such other parts of the Project, as DaimlerChrysler may request, to enable others to hasten or properly carry on their work.

4.15) Materials and Equipment

Contractor and its subcontractors may purchase material and equipment only from sources approved by DaimlerChrysler and will promptly furnish to DaimlerChrysler a list of the manufacturers and suppliers from whom Contractor and its subcontractors propose to purchase material and equipment and, additionally, upon DaimlerChrysler's request, (a) priced copies of orders pertaining to materials and equipment and any available information relating to projected delivery dates and (b) samples of any material or finish to be used or applied to the Project, which samples shall be equal to the material or finish actually used or applied to the Project. DaimlerChrysler's approval or Contractor's furnishing of samples shall not relieve Contractor of its obligation to comply with the requirements of the Contract, including specifically the Specifications. All material and equipment used or ordered for the Project must, unless otherwise expressly permitted by the Contract Documents, conform to the applicable standards of American Society for Testing Materials, American Standards Association, American Railroad Engineering Association, National Electric Code, National Fire Protection Association, Factory Mutual System, American Concrete Institute, American Institute of Steel Construction, and local and state building codes.

Unless specifically authorized by DaimlerChrysler in writing, all spray-on fireproof materials and spray-on thermal insulation must be non-fibrous and all paint applied must be lead-free.

Contractor will be responsible for unloading, inspecting and storing all material and equipment owned or used by it for or in connection with the Project and for paying any demurrage that may accrue. Any material purchased by Contractor for use on the Project must be delivered directly to Contractor as consignee. Contractor will be responsible for all DaimlerChrysler-supplied material from the time of its delivery to Contractor and will return any surplus of DaimlerChrysler-supplied material to DaimlerChrysler No materials, other than waste and rubbish, may be removed from the job site without DaimlerChrysler's prior written approval.

Contractor will be responsible for all loss, damage or theft of equipment, tools, machinery and materials, whether owned or rented by Contractor, DaimlerChrysler or a subcontractor.

Upon notification by the Owner, the Contractor shall immediately remove and replace to the satisfaction of the Owner, all material and work of unsound or unfit character. The expense of removing, reconstructing, replacing or refinishing unsound or unfit materials and work, the cost of making good other work affected thereby, and the cost of delays resulting therefrom, shall be borne by the Contractor and no extension of time will be allowed for such correction of faulty material or work.

4.16) Accident Prevention, Health and Safety

Sewers previously cleaned in Building 40B contained an oil phase that exceeded *TCLP limits* for lead at 18 milligrams per kilogram (mg/kg) and for trichloroethene (3,060 µg/kg). Analyses of the oil phase of the sample also reported detections of cis-1,2-dichloroethene (1,940 micrograms per kilograms [µg/kg]), and n-propylbenzene (1,470 µg/kg). Methylene chloride and acetone were reported at concentrations above *detection limits*, however these are common laboratory reagents and may not actually be present in situ. The water phase of the sample exceeded detection limits for cis-1,2-dichloroethene (274 µg/kg).

Detectable concentrations of various chlorinated compounds including, but not necessarily limited to, tetrachloroethene (PCE), trichloroethene (TCE), 1,2-dichloroethene (DCE), 1,1,1-trichloroethane (TCA), and methylene chloride, have previously been reported from soil and/or soil gas samples collected from Building 40B. Though not previously reported from sample analyses, vinyl chloride is a known degradation product of at least some of these detected compounds. Therefore, the Owner cannot discount or confirm the possible presence of vinyl chloride.

Contractor will, as required by performance of the Project and conditions existing at the job site, take, maintain and provide all reasonable precautions, protections and safeguards to prevent damage, destruction, injury or loss to its employees, the Owner's employees, subcontractors or other persons, to the Project or materials and equipment to be incorporated therein, to other property at or near the job site, or to adjacent properties, including without limitation posting danger and other warning signs, providing monitoring equipment and devices, lights, barricades, vapor barriers, railings and other safeguards, promulgating safety rules, and notifying owners and users of adjacent sites and utilities.

Contractor will at all times (a) give such notices as are required by, and comply with all applicable laws, ordinances, rules, regulations and lawful orders of public authorities relating to safety or protection of workers, property and environment, including without limitation OSHA standards, rules and regulations and the following federal regulations: Hazard Communication (29 CFR 1910.1200), and 29 CFR 1926 59), Lead (29 CFR 1926.62), Asbestos (29 CFR 1926.1101), Permit-Required Confined Spaces (29 CFR 1910.146), Hazardous Waste Operations and Emergency Response (29 CFR 1910.120, 29 CFR 1926.65), (b) comply with the provisions of Appendix A hereto and all other safety regulations of DaimlerChrysler, as amended from time to time, and (c) maintain good order and discipline among its employees. Contractor will not employ on the Project any unfit person or any person not skilled in the work assigned to him or her, and will not use the Project as a training program for any employee. Contractor will defend, indemnify and hold DaimlerChrysler harmless from all losses, damages, liabilities, costs and expenses, including attorneys' fees, arising out of or in connection with any breach or violation by Contractor of its obligations under this and the immediately preceding paragraph of this Section.

The Contractor shall provide documentation to the Owner, prior to beginning the work, that all on-site Contractor employees, sub-contractors, and personnel have been trained in the proper use of protective clothing and other personal protective equipment (PPE) in accordance with 29 CFR Part 1910 ("Hazwoper"). The Contractor shall prepare and submit to Owner, prior to beginning the work, a site-specific health and safety plan prepared in accordance with applicable OSHA requirements.

The Contractor is solely responsible for the health and safety of its employees, sub-contractors, and personnel, and will coordinate health and safety concerns among themselves and with other contractors, if any, on the job site. If Contractor is designated by the Contract Documents as the general contractor, Contractor has overall responsibility for the coordination of health and safety services for the Project.

The Contractor shall provide a designated health and safety officer, thoroughly trained and familiar with health and safety supervision and monitoring, to monitor and supervise working conditions and Contractor's employees, sub-contractors, and personnel. The designated officer shall be on duty at all hours that Contractor's employees, sub-contractors or personnel are working to patrol the premises and with authority to set required levels of PPE for conducting the work, to establish and maintain health and safety work zones as necessary, and to take immediate remedial action to assess the potential of, and minimize or eliminate, health and safety issues related to the work.

The Contractor shall provide its employees with approved eye protection, which they will be required to wear at all times in the Owner's plant. Also, Contractors and their employees will wear appropriate protective headgear (hard hats) while performing work in any part of the plant, building or property. Contractor shall supply all other PPE as required to complete the work. The Contractor shall be prepared to upgrade PPE levels, without undue interruption or delay of the work, should conditions warrant.

The Contractor shall provide and properly maintain a suitable means of monitoring, mitigating, controlling and/or venting fugitive vapors and exhaust fumes which may contain unpleasant, irritating, toxic and/or hazardous substances, that may result from the work, subject to approval of the Owner. It is intended that such fugitive vapors

or fumes, if generated or encountered, be mitigated, controlled, and/or vented so as to protect worker health and safety and comfort. ***In no instance shall such vapors or fumes be detected olafactorily or otherwise, outside the boundaries of the designated work areas.***

The Contractor shall comply with the "Safety and Engineering Practices" set forth in the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America and with all applicable Federal, State and Local Safety and Sanitary Laws, Regulations and Ordinances, as well as the established safety rules and practices of the Owner.

The Contractor shall properly protect the Owner's and adjoining property from injury and except as hereinafter provided in the section entitled "Owner's and Contractor's Responsibilities for Fire and Extended Coverage Insurance Hazards," shall at his expense, make good any damage to same without delay.

Any electrical machinery or equipment used in the Owner's plants, must be equipped with suitable electrical receptacles and/or connectors. Temporary exposed wiring connections will not be permitted.

4.17) Explosives

The Contractor shall obtain the permission of the Owner before using dynamite or other explosives on the property of the Owner and shall be governed by the established safety rules and practices of the Owner and Federal, State, and City Regulation in their use and storage.

4.18) Fire Protection

The Contractors and Sub-Contractors shall take all necessary precautions to guard against and eliminate all possible fire hazards and to prevent damage to any construction work, building materials, equipment, temporary field offices, storage sheds, and all other property, both public and private. The location of the nearest corporation or public fire alarm box and the phone number of the local fire department shall be conspicuously posted by the Contractor throughout the field offices and in the building structure adjacent to this work.

The Contractor's superintendent in charge of the project, together with the Owner shall inspect the entire project at least once each week to make certain that they adhere to the conditions and requirements set forth herein.

Employees shall not be allowed to start fires with gasoline, kerosene, or other highly flammable materials. No open fires will be permitted.

No welding, flame cutting, or other operations involving the use of flame, arcs or sparking devices will be allowed without adequate protection and shielding particularly at the point of operation and prior permission of the Plant Engineer. All combustible or flammable material shall be removed from the immediate working area. If removal is impossible, all flammable or combustible materials shall be protected with an asbestos fire blanket or suitable non-combustible shields to prevent sparks, flames, or hot metal from reaching the flammable or combustible materials. The Contractor shall provide the necessary personnel and fire fighting equipment to effectively control incipient fires resulting from welding, flame cutting or other operations involving the use of flame, arcs or sparking devices.

The Contractor shall be responsible at his expense during the entire construction period for providing and maintaining the following material, equipment and services and for meeting the following conditions and requirements:

Fire Extinguishers

Provide and maintain in working order at all times, during construction, not less than four (4) fire extinguishers conveniently located for proper protection for each building having 5,000 sq. ft. of total floor area or less. One (1) additional fire extinguisher shall be provided for each additional 5,000 sq. ft. of floor area.

Fire extinguishers shall be either a 2½ gallon capacity water type gas cartridge expelled unit or a 5 gallon capacity pump type protected from freezing by use of calcium chloride, all to meet the approval of the Fire Underwriter's Laboratory, and shall be inspected at regular intervals and recharged if necessary.

In areas of flammable liquid, asphalt or electrical hazards, extinguishers of the 15 lb. carbon dioxide type or 20 lb. dry chemical type shall be provided.

At least one (1) qualified person satisfactory to the Owner and thoroughly familiar with fire protection and prevention, shall be on duty at all hours that Contractor's employees are working to patrol premises with authority to take immediate remedial action to eliminate unnecessary fire hazards.

4.19) Flammable, Toxic and Hazardous Materials or Substances

Gasoline, benzene or like combustible materials, together with all flammable or waste material subject to spontaneous combustion, or other toxic or hazardous materials or substances, including excavated soils, liquid, and solid sewer pipe contents, and fugitive vapors or exhaust fumes, shall not be improperly handled, stored, discharged to the air or ground, or be poured into sewers, manholes or traps, but shall be treated and/or disposed of, in a manner approved by the Owner and in accordance with applicable local, state, and federal requirements. The Contractor shall obtain permission from the Owner before bringing/removing any of the foregoing materials to/from the site and shall make appropriate arrangements for storing of the same.

The Contractor shall provide all necessary equipment to clean and/or decontaminate excavation or other equipment, including but not limited to, a steam cleaner/pressure washer and decontamination pad. The Contractor shall collect and properly contain any fluids or solids resulting from such cleaning and/or decontamination.

Not more than a one (1) day supply of flammable liquids such as oil, gasoline, paint or solvent shall be brought into any building at any one time. All flammable liquids having a flash point of 110 degree F or below, which must be brought into any building, shall be confined to the Underwriter's Laboratories labeled safety cans. The bulk supply of all flammable liquids shall be detached at least 75 ft. from the building and from yard storage of building materials. Spigots on drums containing flammable liquid are prohibited on the project site. Drums are to be equipped with approved vented pumps.

No tar melting kettles or tar heating devices of any kind will be permitted inside, on the roof or within 50 ft of any building. When any of these conditions cannot be complied with, then a special written deviation permit must be issued by the Plant Engineering Activity and approved by the local Plant Protection Department. Deviation requests will only be approved in exceptional circumstances.

All tarpaulins used during the course of construction shall be of a flameproof type secured in place against damage or "flapping" from the winds.

All oil soaked rags, papers and other combustible materials shall be removed from any building at the close of each day's work or more often if necessary, and shall be placed in metal containers with self-closing lids.

4.20) Patching and Replacing of Damaged Work

The Contractor shall be held responsible for all damage to the work that is caused by his work, workmen or by his subcontractor. Patching and replacing of damaged work, except as provided under the heading of "Glass Damage," shall be done as directed by the Owner, but the cost of the same shall be paid by the Contractor.

At completion of the work, damage to the buildings, roofs, drivers, walks, underground and overhead work, etc., shall be made good to the satisfaction of the Owner at the Contractor's expense.

The Contractor shall be responsible for any and all loss of materials connected with the construction because of unexplainable disappearance, thefts or misappropriations of any kind or nature.

4.21) Glass Damage

Contractor will be responsible for all breakage or other damage to glass installed at the job site until buildings are turned over to DaimlerChrysler. Contractor must have all glass cleaned by professional window washers immediately prior to turning buildings over to DaimlerChrysler. Contractor must replace any damaged glass at its expense.

4.22) Cleaning of Premises

The Contractor shall at all times keep the entire premises free of rubbish and debris caused by his work and his employees, or by his subcontractors, and upon completion of the work shall leave all buildings and surroundings included in the contract broom-clean. The Contractor shall also remove from the premises all items such as temporary partitions, office and storage sheds, fence material, etc., which are used for temporary purposes during construction.

Should the Contractor fail to do the required cleaning work immediately upon request, the Owner may do the cleaning work and charge the cost of same to the account of the Contractor.

4.23) Building Roof

The Contractor is expected to use maximum care to protect the Owner's roof at all times. All materials stored on the roof shall be set on planks and spread to reduce the weight loading. Movement across the roof shall be on planks The Contractor shall be responsible for any damage incurred by material movement or equipment installation.

4.24) Demolition and Removal Work

Demolition includes removal, proper storage, and disposal of demolished materials, as directed by Owner.

Submit proposed methods and operations of building demolition to Owner's Representative for review prior to start of work. Include in schedule coordination for shut-off, capping and continuation of service encountered.

Conduct demolition operations and removal of debris to ensure minimum interference with adjacent occupied or used facilities.

Do not close aisles or obstruct Owner's operations or facilities without written permission from the Owner's Representative.

Ensure safe passage of persons around area of demolition. Conduct operations to prevent injury to structures, facilities and persons.

Provide interior dust proof partitions to separate Owner occupied areas and construction areas as determined by the Owner's Representative; partitions shall be 2" x 4" wood stud covered with ½" plywood or 6 mil polyethylene sheet or other system acceptable to the Owner's Representative; tape all joints, provide gasket at sill and header plate; carry partitions to construction above; provide hinged wood doors or overlapping sheet plastic doors.

Promptly repair damage caused to adjacent facilities or construction by demolition operations and at no cost to the Owner.

Maintain existing utilities that are to remain, keep in service, and protect from damage.

Use water sprinkling, temporary enclosure, and suitable means to limit dust and dirt rising and scattering in air to lowest practical level.

Removal of concrete shall begin with a saw-cut full depth of slab.

Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations, and acceptable to the Owner's Representative. Return adjacent areas to condition to existing prior to start of work.

Removal work includes, but is not limited to the following:

a) Removal of portion of concrete floor and/or parking lot surfaces for sewer line access.

b) Restoration of same.

4.25) Earthwork

Existing Utilities: Locate by hand excavation and provide protection from damage. Cooperate with Owner for maintaining services. Do not break utility connections without providing temporary services. Repair damages to existing utilities as directed by the Owner's Representative.

Protections: Protect structures, utilities and other facilities in areas of work. Barricade open excavations and provide warning lights. Comply with regulations of authorities having jurisdiction.

Excavation: Excavation shall proceed with care to avoid damage to both known and unknown underground services. Remove, properly store, and dispose of material, as directed by Owner and at an Owner-approved facility, to obtain required sub-grade elevations, including floor slab, obstructions visible on ground surface, underground structures and utilities indicated. Owner will provide sampling and analysis of excavated materials.

Shoring: Provide bracing, shoring, and/or sheeting as required in any excavation, to maintain sides and to protect adjacent structures from settlement, complying with Federal, State, and Local Codes and Regulations. Maintain until excavations are back-filled.

Fill Material: Shall be certified clean, consist of naturally or artificially graded mixture of natural or crushed gravel, or crushed stone, and be free of vegetation or other objectionable materials such as clay, loam or perishable materials. Place and compact fill material in maximum 8" layers to required elevations. Back-fill excavations as promptly as work permits.

Compaction: Compact each layer of back-fill and fill materials and the top 12" of sub-grade for structures and slabs. The approved granular material shall be compacted to a density equivalent to 95 percent modified proctor.

Disposal: Remove and dispose recovered liquids and solids, excavated material, trash, debris, and waste material from site, as directed by the Owner, at an Owner-approved facility.

4.26) Concrete

Codes & Standards: Latest edition of ACI #301 "Specifications for Structural Concrete Buildings," ACI #302 "Recommended Practice for Concrete Floor and Slab Construction," American Concrete Institute; "Manual of Concrete Practices," ACI #347 "Recommended Practice for Concrete Form-work," ACI #318 Building Code Requirements for Reinforced Concrete." Contractor shall comply with the applicable provisions except as otherwise indicated and with the following supplemental requirements:

a) All concrete shall be normal weight with aggregates conforming to ASTM C33.
b) Concrete shall develop the following 28-day compressive strength (FC'):
Floor Slab - 4,000 PSI
Foundation - 3,500 PSI
c) Chloride based admixtures are prohibited in all reinforced concrete. Other admixtures shall conform to ASTM C494.
d) Reinforcing steel shall be deformed bars conforming to A615 Grade 60, unless otherwise indicated with a minimum yield stress (FY) of 60,000 PSI. The minimum lap for splice shall be 3"-0."
e) Concrete cover or reinforcing steel shall be 3" unless otherwise noted.
f) Maximum slump shall be 4" +/-1" as determined in accordance with ASTM C143.
g) Concrete Finish:
Floor Slabs - Hand trowel FF 30/FL 25 Finish
Paving Slabs - Float/Broom

Admixtures: Use air-entraining admixture, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content within following limits:

a) Slab and curb 2 to 4 percent air.
b) Proportion and design mixes to result in concrete slump at point of placement as follows. Slab and curbs not less than 1" and not more than 4."

Normal Weight Concrete Properties: Design mixes to provide normal weight concrete to provide 4000 PSI strength unless otherwise indicated on drawings and schedules, and based on following ACI Standard Sections.

a) ACI #318 - 77, Chapter #4.
b) ACI #211.1 - 77.

4.27) Concrete Materials

Portland Cement ASTM-C #150, type as required.

Aggregates ASTM-C #33, except local aggregates of proven durability may be used when acceptable to Owner's Representative.

Water clean, drinkable.

Air-entraining admixture ASTM-C #260.

Water reducing admixture ASTM-C #494 Only use admixtures which have been tested and accepted in mix designs, unless otherwise acceptable.

4.28) Related Materials

Replace asphalt, as required, to match existing.

Liquid curing-hardening sealing compound Curecrete Chemical Company "Ashford Formula".

4.29) Reinforcing Material

Welded wire fabric ASTM #185.

4.30) Forming and Placing Concrete

Job-site mixing use drum batch machine mixer, mixing not less than 1½ minutes for one (1) cubic yard or smaller capacity. Increase mixing time at least 15 seconds for each additional cubic yard or fraction thereof.

4.31) Form-Work

Construct form-work so that concrete members and structures are of correct size, shape, alignment, elevation and position.

4.32) Installation of Embedded Items

Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by cast-in-place concrete. Use setting diagrams, templates and instructions provided by others for locating and setting.

4.33) Concrete Placement

Comply with ACI placing concrete in a continuous operation within planned joints or sections. Do not begin placement until work of other trades affecting concrete is complete. Consolidate placed concrete using mechanical vibrating equipment with hand rodding and tamping, so that concrete is worked around reinforcement and other embedded items and into forms.

4.34) Concrete Finishes

Exposed-To-View Surfaces: Provide a smooth finish for exposed concrete surfaces. Remove fins and projections, remove defective areas and repour to match existing.

Slab Trowel Finish: Apply trowel finish to monolithic slab surfaces that are exposed-to-view. Consolidate concrete surfaces by finish troweling free of trowel marks, uniform in texture and appearance.

Curing-Sealing-Hardening Finish: As necessary or required, apply selected sealant or hardener to floor areas, as soon as surface is firm enough to walk on and before hairline checking and temperature checking occurs, and by methods and at rates of application as recommended by the material manufacturer.

4.35) Metal Fabrication

Codes & Standards: Latest edition of AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" including "Commentary," AWS "Structural Welding Code," comply with applicable provisions unless otherwise indicated.

Steel Plates, Shapes and Bars: ASTM-A #36.

Unfinished Fasteners: Nuts and bolts, ASTM-A #307 grade.

Shop Paint: FS TT-P-86, Type II, SSPC-Paint #2, or Tnemec Company Inc. "99 Red Metal Primer." Apply to cleaned and degreased steel surfaces at rate to provide a 2.0 mil dry film thickness.

Miscellaneous Framing and Support: Provide as required to complete work. Fabricate of welded construction in as large units as possible. Include required anchors for building into other work; spaced not more than 24" on centers.

Installation: Perform cutting, drilling and fitting required for installation, set work accurately in location, alignment and elevation, measured from established lines and levels. Provide anchorage devices and fasteners where necessary for installation to other work. Touch-up shop paint after installation. Clean field welds, bolted connections and abraded areas, and apply same type paint as used in shop.

4.36) Flashing and Sheet Metal Work

Fabrication: General, comply with "Architectural Sheet Metal Manual" by SMACNA, for each general category of work required.

4.37) Reporting, Inspection and Testing

All work and materials used or to be used for the Project shall at all times be subject to inspection and approval by DaimlerChrysler or its designated representative. Such inspection and approval, or the lack thereof, will not relieve Contractor of any of its obligations under the Contract. Contractor will provide sufficient, safe and appropriate facilities for such inspection and will supply full information on all materials used. At DaimlerChrysler's request, all work performed at the job site or elsewhere without opportunity for inspection by DaimlerChrysler or its designated representative, whether by Contractor or its subcontractors, must be uncovered for inspection at Contractor's expense. Contractor will keep DaimlerChrysler continually informed of the status of the Project, including any work in transit, in fabricating shops or elsewhere, and will be responsible for all delays resulting from failure to provide work in the proper manner and time. Contractor will immediately report to DaimlerChrysler circumstances that may cause Project delays.

Contractor will at its own expense field-test all equipment in the presence of DaimlerChrysler's designated representative and, in the case of any test on fire protection systems, Contractor will give Factory Mutual System reasonable advance written notice so that Factory Mutual System may witness the test. Contractor will promptly submit a copy of the completed Contractor's Material & Test Certificate for Fire Protection Equipment to Factory Mutual System. Contractor must shut down any equipment found to be defective and ensure that such equipment, until properly repaired or replaced, is not used by DaimlerChrysler employees or others

Performance testing must be performed by Contractor as required by the Contract Documents before acceptance of the Project by DaimlerChrysler. All tests must be performed under the supervision and direction

DaimlerChrysler's designated representative. Contractor must provide all required materials, labor and apparatus necessary to perform the test or, if so directed by DaimlerChrysler's representative, engage an approved testing laboratory to perform the tests. Contractor will deliver to DaimlerChrysler all manuals, drawings, and written instructions regarding equipment upon DaimlerChrysler's acceptance thereof. Any work (including any system, material or equipment) shown to be defective must be removed, replaced and retested, all at Contractor's expense, until DaimlerChrysler is satisfied as to the performance of the item tested. Contractor is responsible for the cost of the original test if that test showed the work to be defective. Except for tests required by the Contract Documents, if a test required by DaimlerChrysler's representative demonstrates that the requirements of the Specifications have been fulfilled, the cost of that test will be paid by DaimlerChrysler.

4.38) Warranties

Contractor represents and warrants that all materials and equipment furnished under the Contract will be new (unless otherwise expressly permitted by the Contract), merchantable and of good quality, and that the Project will be free from defects and conform to the requirements of the Contract Documents. Work, material or equipment that does not conform to these requirements, including substitutions not properly approved or authorized by DaimlerChrysler, may be considered defective.

At any time prior to completion of the Project, Contractor will within 24 hours of receiving written request from DaimlerChrysler proceed to remove from the Project all defective materials, whether assembled or not, dismantle all portions of the Project which are defective, unsound, improper, or in any way fail to conform with the requirements of the Contract, and replace all such work and materials at its own expense. Expenses attributable to unsound, improper or unfit DaimlerChrysler-supplied materials, if any, will be borne by DaimlerChrysler. The deadline for completing the Project will not be extended because of any need to correct faulty work, equipment or material.

Contractor must execute and deliver to DaimlerChrysler, before final payment, a written guarantee, for a term of two years from the date DaimlerChrysler accepts the Project, that all labor and material furnished, and all work performed, by Contractor and its subcontractors are in accordance with the Contract. (If the guarantee required under any trade section of the Specifications is for a period different than two years, Contractor's guarantee shall, with respect to such trade, be for that different period.) Contractor must obtain for DaimlerChrysler similar written guarantees from its subcontractors covering the subcontractors' respective portions of the Project, which guarantees must expressly provide that they are enforceable directly by DaimlerChrysler and run concurrently with Contractor's guarantee. Contractor will repair, or remove and replace, at DaimlerChrysler's convenience and at not cost to DaimlerChrysler, all workmanship or materials which DaimlerChrysler reasonably deems to be defective at any time within two years following the date of final acceptance of the Project by DaimlerChrysler.

Contractor will procure for DaimlerChrysler's benefit and pass on to DaimlerChrysler all warranties and guarantees received from manufacturers and suppliers.

4.39) Payment

DaimlerChrysler will pay Contractor in accordance with the provisions of the Contract, which payment shall constitute full compensation to Contractor for all work performed and all things furnished under the Contract. Payment by DaimlerChrysler, whether in full or in part, shall not be construed as a waiver of any breach of the Contract or as acceptance of defective or non-conforming work and shall not relieve Contractor of its responsibility for performing in accordance with the Contract.

Interim payments, if any, will be made only after approval by DaimlerChrysler of the then completed work. If interim payments are requested on a fixed-price contract, such payment will be calculated as a percentage of the total fixed-price contract cost using as basis the work completed at the time of billing. If interim payments are requested on a cost-plus or fee-type contract, such payments will be based on Contractor's actual material and labor costs as evidenced by employees' time cards and suppliers' invoices for materials and supplies delivered to and used at the job site. In making any interim payments, DaimlerChrysler may retain ten percent of the amount of the invoice until final completion and acceptance of the Project by DaimlerChrysler.

All requests for payment must reference DaimlerChrysler's purchase order by number, be accompanied by Contractor's sworn statement, in a form acceptable to DaimlerChrysler, setting forth the original amount of the Contract, the net amount of changes, the amount of the Contract as the date of the sworn statement, the total amount previously paid, the unpaid balance, and the total amount of payment requested by Contractor, and must be accompanied by partial lien waivers and such other documentation as DaimlerChrysler may request. Similar information must be included in the sworn statement with respect to each subcontractor for whom payment is requested.

Before any payment is made by DaimlerChrysler under the Contract, Contractor must provide DaimlerChrysler with satisfactory evidence that all payrolls, bills for materials and supplies and other indebtedness in connection with the Project have been paid, and that all liens, claims or suits for labor performed or materials and supplies furnished in connection with the Project have been released, satisfied, settled or dismissed with prejudice. Contractor agrees to hold DaimlerChrysler harmless from any such liens, claims, and suits.

If a claim or lien for which DaimlerChrysler may become liable should exist, DaimlerChrysler has the right to retain out of any payments due Contractor an amount sufficient to indemnify DaimlerChrysler from any loss or damage which might result from such claim or lien (including all costs and attorneys' fees), provided that upon payment of such claim or lien by Contractor the amount retained by DaimlerChrysler on account of such claim or lien shall be shall be paid to Contractor and, further provided, that if Contractor shall furnish to DaimlerChrysler an indemnity bond issued by a bonding company or other surety approved by DaimlerChrysler in an amount, and in all other respects, satisfactory to DaimlerChrysler and indemnifying DaimlerChrysler against such claim or lien, the amount retained by DaimlerChrysler on account of such claim or lien shall be paid to Contractor.

Final payment of all moneys due but not previously paid to Contractor will be made in accordance with the Contract after DaimlerChrysler accepts in writing the completed Project (including punch list items) and Contractor furnishes DaimlerChrysler evidence satisfactory to DaimlerChrysler that all liens, claims, and suits chargeable to DaimlerChrysler or against DaimlerChrysler's premises have been fully paid, satisfied, released or dismissed with prejudice.

4.40) Accounts and Audits

Contractor will keep full and detailed accounts of all labor, materials and costs relating to the Project to DaimlerChrysler's satisfaction. All books and records of Contractor pertaining to the Contract may be inspected and audited by DaimlerChrysler and its designated representatives at any time prior to three years after final payment is made by DaimlerChrysler under the Contract.

4.41) Project Changes and Price Adjustments

DaimlerChrysler may at any time, without voiding the Contract, propose or order changes to the Project, the Drawings and the Specifications, including, but not limited to, the omission of work previously ordered or the inclusion of additional work. Contractor will promptly, and in any event no later than thirty days after receiving written notice of DaimlerChrysler's proposed change or order, submit to DaimlerChrysler in writing Contractor's quotation regarding the additional costs or credits, complete as a unit, and itemized in detail as to labor, material and other changes. Contractor acknowledges that there will be no increase in the purchase order price if the quotation is not submitted within thirty days from receipt of DaimlerChrysler's written notice or order or within such further time as DaimlerChrysler may allow in writing. However, if, in the opinion of DaimlerChrysler, a credit is due DaimlerChrysler, DaimlerChrysler may notify Contractor in writing at any time, and the claim for credit will be adjusted to the mutual satisfaction of Contractor and DaimlerChrysler before final payment is made. Contractor must include in all subcontracts provisions necessary to secure any subcontractor's estimates and material prices within the time frame provided in this paragraph. No claim by Contractor for increased compensation for any changed work (except when done pursuant to written authorization from DaimlerChrysler) will be considered unless written notice of the claim is given to DaimlerChrysler before commencement of the changed work. Modified Contract Drawings, without a written order, do not constitute written authority. Contractor will proceed with the changed work when so ordered in writing by DaimlerChrysler. The provisions of the Contract shall apply to all changed work ordered by DaimlerChrysler with the same effect as if originally embodied in the Contract unless otherwise specifically agreed to by DaimlerChrysler in writing. Omission by DaimlerChrysler of any work previously ordered shall not entitle Contractor or its subcontractors to claim damages or loss of profit on the part of the Project that is omitted.

If unit prices are stated in the Contract, the price to DaimlerChrysler of the changed work will be computed in accordance with the unit prices provided. If unit prices are not stated in the Contract, the price to DaimlerChrysler of the changed work will be computed in accordance with either sub-Section (a) or sub-Section (b) below as directed by DaimlerChrysler:

(a) Upon DaimlerChrysler's request, Contractor must submit unit prices, determined in accordance with a fair and reasonable valuation made by Contractor and approved by DaimlerChrysler for the changed work. Computations must be shown in sufficient detail to permit validation by DaimlerChrysler, and all information required by DaimlerChrysler to establish a fair valuation of the changed work must be promptly submitted by Contractor.

(b) The price to DaimlerChrysler for changed work performed by Contractor on an actual cost plus fee basis will be computed as the sum of the following: (i) the actual cost to Contractor or its subcontractors of all direct labor performed (including foremen employed continuously on the changed work, but not the salary, or any part thereof, the Contractor's superintendent[s]) and all materials furnished for and used in the changed work less all available cash, trade and other discounts; (ii) the rental cost to Contractor or its subcontractors for the use of equipment with an individual value in excess of $300, provided that the amount of the rental charge and the use of the equipment have been authorized in writing by DaimlerChrysler; (iii) any costs incurred and paid by Contractor or its subcontractors, which is properly allocable to the changed work, for royalties, permits and inspection fees; (iv) any premium paid by Contractor or its subcontractors for proper and necessary insurance which is properly allocable to the changed work and any payroll tax which is applicable and properly allocable to the changed work; and (v) a fee, either pre-negotiated or not in excess of 12.5% of the sum of the costs determined solely in accordance with clauses (i), (ii) and (iii). This fee shall constitute full compensation to Contractor for any cost or expense that has not been enumerated as well as for overhead and profit. Subcontractors will receive that part of the fee that Contractor allots and pays to them.

If DaimlerChrysler directs Contractor to proceed with the changed work pending the submission of a unit price, Contractor will proceed on an actual cost plus fee basis, as provided in sub-Section (b) above. If the unit price is not acceptable to DaimlerChrysler, then, except as otherwise may be directed by DaimlerChrysler, Contractor will continue and complete the changed work and the price to DaimlerChrysler will be computed in accordance with sub-Section (b) above.

Contractor must keep and present, in the manner DaimlerChrysler directs, an accurate account of all costs together with all supporting documentation. The account is subject to audit by DaimlerChrysler.

4.42) Notices

All notices and payments required to be given to DaimlerChrysler by the Contract must be in writing and directed to DaimlerChrysler Corporation 1000 Chrysler Drive, Auburn Hills, Michigan 48326-2766 with a copy given to DaimlerChrysler's designated representative identified in the purchase order. Notices to either party hereunder must be sent by (a) certified mail, return receipt requested, (b) facsimile, with a confirmation copy dispatched promptly by certified mail, return receipt requested, or (c) by courier service. A notice takes effect upon the earlier of the notified party receiving the notice or four days after the notice is sent.

4.43) No Waiver

No term or condition of the Contract shall be deemed waived, and no breach consented to, by DaimlerChrysler unless such waiver or consent is in a writing signed by an authorized representative of DaimlerChrysler. No waiver of any right or consent to any breach by DaimlerChrysler shall constitute a waiver of any other right or consent to any later or other breach.

4.44) Survival

The provisions of Sections 4 5, 4.11, 4.16, 4.38, 4.40, 4.47, 4.48, 4.50 and 4.51 shall survive completion of the Project and termination of the Contract.

4.45) Miscellaneous

The Contract sets forth the entire agreement between DaimlerChrysler and Contractor and supersedes any prior negotiation, understanding, representation or agreement between them with respect to its subject matter.

The Contract shall be construed and interpreted in accordance with the laws of the State of Michigan without regard to its conflicts of law provisions. Jurisdiction and venue of any action brought by either party are solely in the state or federal courts within the federal Eastern District of Michigan. No agreement or understanding modifying the terms and conditions of the Contract will be binding upon DaimlerChrysler unless in writing and signed by DaimlerChrysler.

Any provision required to be included in the Contract by federal, state or local laws, ordinances, rules or regulations shall be deemed to be incorporated herein.

4.46) Use by DaimlerChrysler

DaimlerChrysler may prior to its acceptance of the completed Project enter upon and use any portion of the Project without compensation to Contractor for such use, and such taking of possession and use shall not be deemed an acceptance of the portion of the Project so taken and used. Contractor will permit DaimlerChrysler, to the extent practicable, to place and install equipment and machinery during the progress of, and prior to completion of, the Project.

4.47) Confidentiality

Contractor, its subcontractors and their employees will keep confidential and not disclose, without DaimlerChrysler's express, prior written permission, information regarding DaimlerChrysler's inventions, processes, systems, methods, trade secrets and other proprietary information which Contractor, its subcontractors and their employees may acquire in performing the Contract or in disclosures by DaimlerChrysler, its employees and agents. The obligation of confidentiality shall terminate when such information becomes publicly known through no breach of the obligations under the Contract.

4.48) Drawings

All drawings for the Project prepared by or for Contractor and its subcontractors must be submitted in such number of copies as requested by DaimlerChrysler to DaimlerChrysler's authorized representative for approval and signing. Contractor will check all drawings, including all measurements, materials, and other details shown thereon, to ensure that they conform with the Drawings and Specifications. With respect to those parts of the Project for which only a portion is completely drawn or detailed on the Drawings, all like work throughout like areas or locations must conform to the portion drawn or detailed on the Drawings unless expressly shown or noted otherwise. Contractor or its subcontractors, as applicable, will revise and resubmit any drawings that is not approved. Contractor must obtain acceptance of shop drawings for fire prevention, automatic sprinkler, fire walls and roofing systems from Factory Mutual System and the state rating bureau with jurisdiction over the Project before submitting such drawings to DaimlerChrysler's authorize representative.

Upon completion of the Project, Contractor will furnish to DaimlerChrysler complete "as built" - drawings in such number of copies as requested by DaimlerChrysler.

Title to original drawings (including shop drawings), blueprints, bills of material, plans and specifications prepared by or for Contractor, or furnished to or by Contractor in connection with the Project shall be and remain in DaimlerChrysler. Contractor will promptly deliver the originals and all copies of the foregoing documents to DaimlerChrysler upon completion of the Project, except that Contractor may retain copies thereof to the extent necessary to maintain a record of work performed by it.

4.49) Suspension

DaimlerChrysler may without cause at any time suspend the Project or any part thereof for such time as DaimlerChrysler may determine. Upon receipt of DaimlerChrysler's notice of suspension, Contractor must stop work on and suspend shipment and deliveries of materials for the suspended part of the Project, and must immediately confer with DaimlerChrysler regarding ways to reduce Contractor's costs during the suspension. DaimlerChrysler will, as its sole obligation to Contractor arising from the suspension, make an equitable adjustment to the purchase order price for increases and decreases in the Contractor's cost of performing the Contract which result from the suspension, provided, however, that no adjustment shall be required for any cost increases to the extent that performance of the Project is, was, or would have been suspended, delayed or interrupted by a cause for which Contractor is responsible.

4.50) Termination for Cause

DaimlerChrysler may terminate the Contract if (i) the Contractor fails: (a) to prosecute the Project with diligence and promptness, (b) to supply sufficient properly skilled workmen or supervision, (c) to supply materials, tools, equipment, facilities, supplies and services of the proper quantity and quality in a timely manner, (d) to make prompt payments to subcontractors, materialmen and laborers, (e) to adhere to all applicable laws, ordinances, regulations, rules (including DaimlerChrysler's rules for protection of workers, property and environment), or (f) to perform any other obligation of Contractor under the Contract; and such failure is not remedied by Contractor within three days after receipt of written notice from DaimlerChrysler informing of such failure, (ii) a petition is filed by or against Contractor in any proceedings under the bankruptcy act, or (iii) Contractor becomes insolvent, generally fails to pay its debts when due, makes an assignment of assets to its creditors, or has a trustee appointed for it.

When any of the above reasons exist, DaimlerChrysler may without prejudice to any other remedies it may have under the Contract, in law or in equity, terminate employment of Contractor by written notice to Contractor and the surety, if any, and may subject to any prior right of the surety, if any, take possession of the job site and all materials, supplies, equipment, tools, and construction equipment and machinery thereon owned by Contractor and finish the Project by whatever method DaimlerChrysler may deem reasonable and expedient. If DaimlerChrysler elects to terminate the Contract, Contractor must promptly remove from the job site all materials, tools, equipment, facilities and supplies belonging to third parties. Contractor will follow any instructions contained in DaimlerChrysler's termination

notice for preserving the work in progress and protecting materials and equipment on the job site or in transit thereto. Contractor shall not be entitled to receive any further payment until completion of the Project. If the unpaid balance of the purchase order price exceeds the cost to DaimlerChrysler of finishing the Project, the excess shall be paid to Contractor. If the cost to DaimlerChrysler of finishing the Project exceeds the unpaid balance of the purchase order price, Contractor shall pay DaimlerChrysler the difference. DaimlerChrysler will certify DaimlerChrysler's cost of completing the work and the certificate shall be final and binding upon Contractor and DaimlerChrysler. DaimlerChrysler will return to Contractor at Contractor's expense all unexpended materials, tools, equipment, facilities and supplies furnished by Contractor for the Project following completion of the Project. The obligation to make payment shall survive termination of the Contract.

4.51) Termination without Cause

DaimlerChrysler may terminate the Contract at any time without cause by written notice to Contractor. Upon receipt of DaimlerChrysler's notice of termination, Contractor will (a) terminate all work under the Contract on the date specified in the notice, (b) terminate all orders and subcontracts which may be terminated without cost, (c) terminate and settle; subject to DaimlerChrysler's approval, other orders and subcontracts where the cost of settlement is less than the cost which would be incurred were the order or subcontract completed, (d) transfer, as directed by DaimlerChrysler, any material, work in progress, supplies, equipment, machinery or tools acquired by Contractor for performance of the Contract for which Contractor is reimbursed, and all drawings, blueprints, plans, and specifications used or to be used in connection with the Project, and (e) follow any instructions given by DaimlerChrysler for preserving the work in progress and protecting materials and equipment on the job site or in transit thereto.

Upon Contractor's compliance with its obligations under clauses (a) through (e) above, DaimlerChrysler will, in complete discharge of all obligations of DaimlerChrysler under the Contract, pay Contractor for the following: the portion of the Project completed by Contractor and its subcontractors up to the date of termination, the cost to Contractor of material and equipment to be incorporated in the Project which has been delivered to the job site up to the date of termination, the cost to Contractor of (i) material and equipment to be incorporated in the Project for which bona fide, irrevocable orders have been placed by Contractor prior to the date of termination and (ii) settling orders and subcontracts pursuant to clause (c) above, and the cost to Contractor of complying with DaimlerChrysler's instruction under clause (e) above. The total amount payable to Contractor under this Section shall in no event exceed the purchase order price. Any cost or expense paid DaimlerChrysler is subject to audit by DaimlerChrysler. DaimlerChrysler will not pay any anticipated profit on portions of the Project not completed.

END OF DOCUMENT

S:\TECH\3CHRY\DAYTON\PROJMGMT\BIDS\SEWER&BS BID

STATUS REPORT AND RECOMMENDATIONS
ENVIRONMENTAL SITE ASSESSMENT

DAYTON THERMAL PRODUCTS DIVISION
DAYTON, OHIO

ACUSTAR, INC.
CHRYLSER MOTORS CORPORATION

August 16, 1991

Prepared for:

ACUSTAR, INC.
1600 Webster Street
Dayton, Ohio 45404

Project 423023

JOHN MATHES & ASSOCIATES, INC.
East Park One Building
701 Rodi Road, Suite 101
Pittsburgh, Pennsylvania 15235-4559
(412) 824-0200

BACKGROUND

- Old Maxwell Complex demolition to make space for Building 59

- Discovery of VOC and TPH contamination in areas of:

  - Concrete Slabs
  - Sewer Lines
  - Process Pipelines
  - Process Sumps
  - Nonhazardous Waste Storage Pad
  - Oil/water Separator
  - TCA Tank
  - Flux Room
  - New Product Barrel Storage
  - Battery Storage

- Soil in Footprint of Building 59

- Soil in adjacent areas to be paved

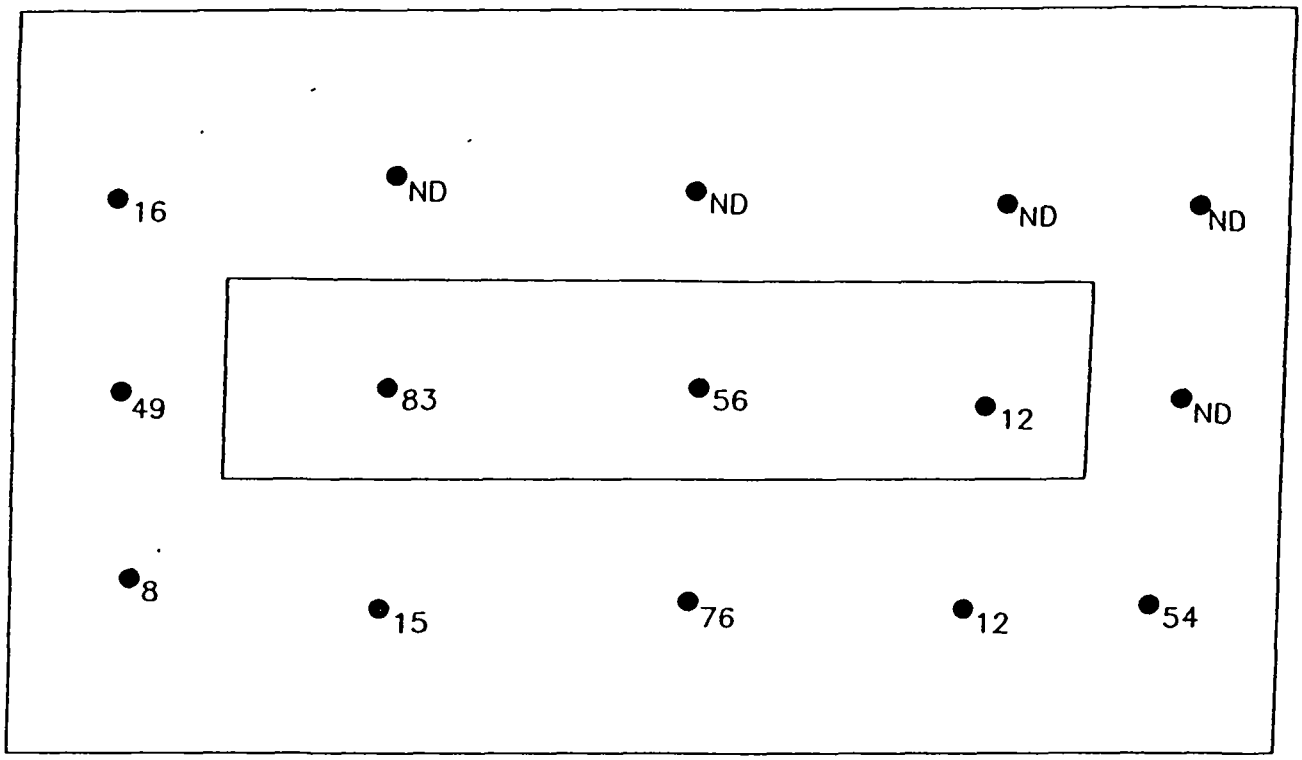
REMEDIAL ACTIVITIES TO DATE

- Special Waste
  - Shipments to Pinnacle Road Landfill
    166 loads (~$25/cubic yard)

- Hazardous Waste
  - Soil
    F001 from 40B
    5 loads ($1,200-$1,500 per cubic yard)
  - Concrete
    Chromium leach
    Lead leach
    11 loads to date ($300-$500 per cubic yard)
    7 additional loads being evaluated

- On-Site Treatment of TPH and VOC Contaminated Soil
  - Building 59 Footprint
  - Adjacent areas to be paved

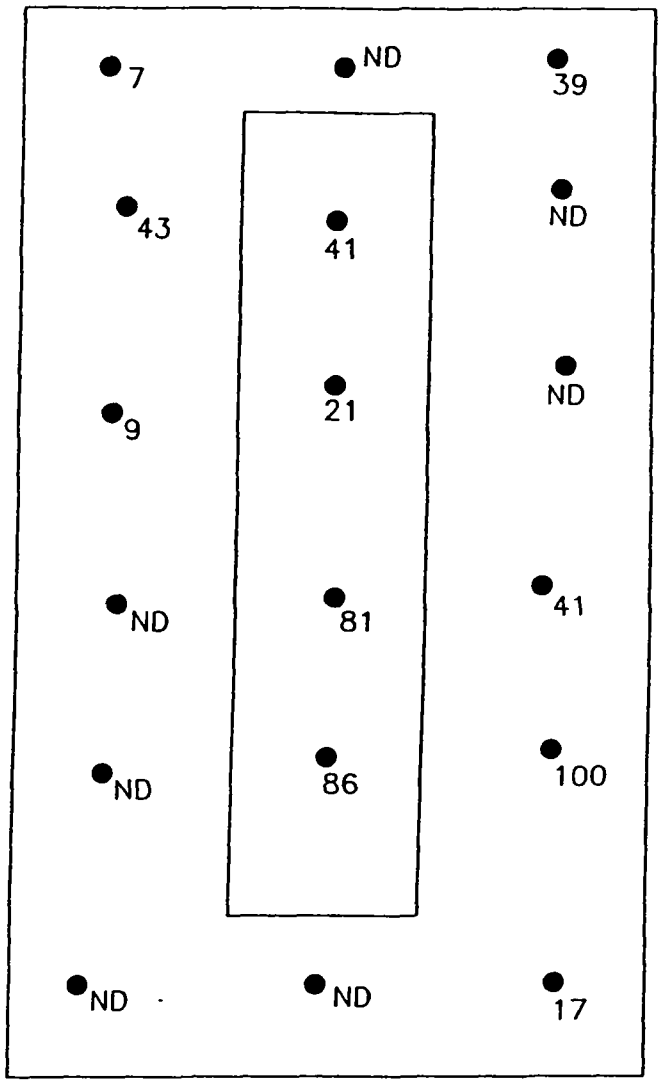
CLEAN SOIL STOCKPILE



EXPLANATION

8 APPROXIMATE SAMPLE LOCATION WITH TOTAL VOLATILE ORGANIC COMPOUNDS (METHOD 8240) IN ug/kg

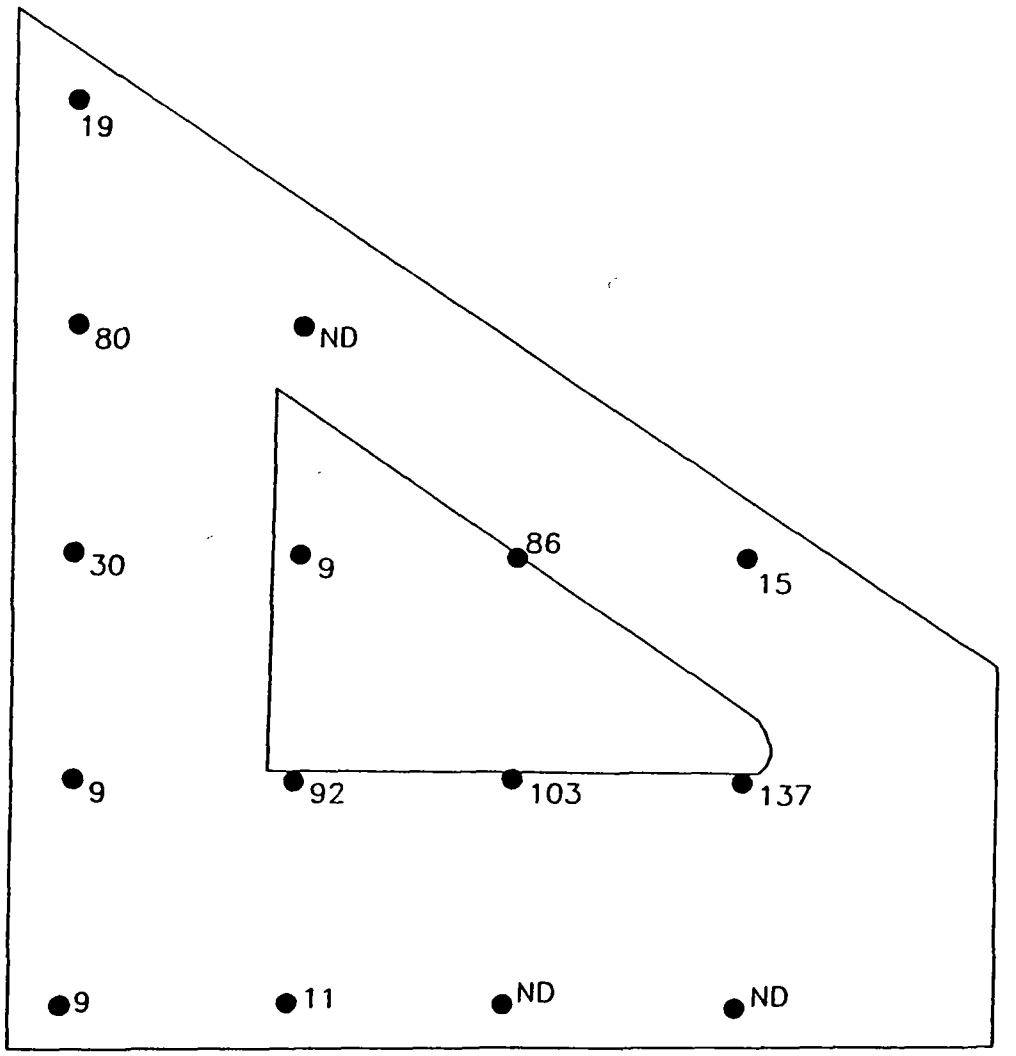
VOC VACUUM EXTRACTION BED



EXPLANATION

ND — APPROXIMATE SAMPLE LOCATION WITH TOTAL VOLATILE ORGANIC COMPOUNDS (METHOD 8240) IN ug/kg

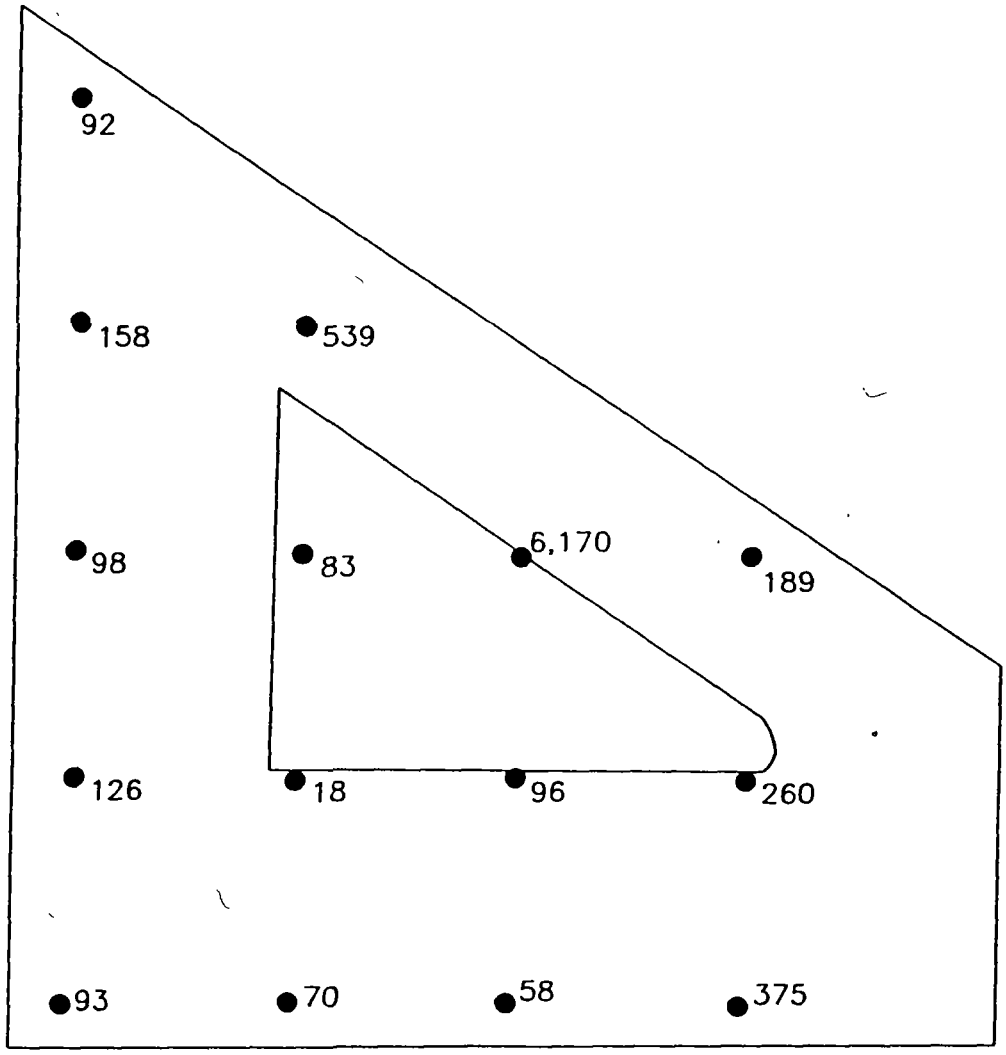
TPH VACUUM EXTRACTION BED



EXPLANATION

● 9 APPROXIMATE SAMPLE LOCATION WITH TOTAL VOLATILE ORGANIC COMPOUNDS (METHOD 8240) IN ug/kg

TPH VACUUM EXTRACTION BED



EXPLANATION

●93 APPROXIMATE SAMPLE LOCATION WITH TOTAL PETROLEUM HYDROCARBONS (METHOD 418.1) IN mg/kg

EXPANDED SITE INVESTIGATION

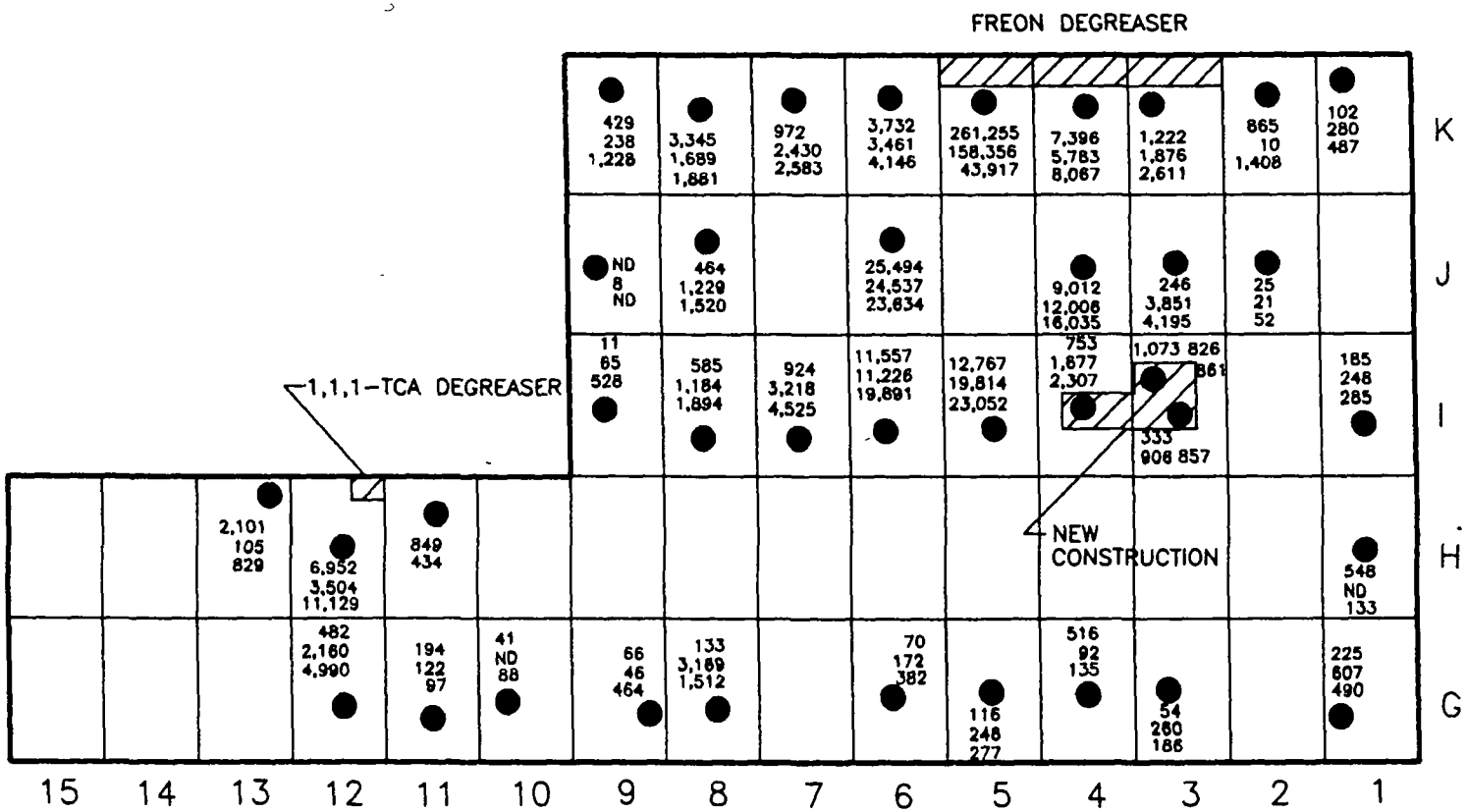
- RECON — Buildings 40A and 40B
  - Soil Gas

- RECON - Site-Wide Reconnaissance
  - Soil Gas
  - Groundwater

- Literature Review
  - Conceptual Subsurface Model

- Surrounding Properties

TOTAL VOCs IN SOIL GAS USING RECON℠ - BUILDING 40A & 40B DAYTON THERMAL PRODUCTS PLANT



EXPLANATION

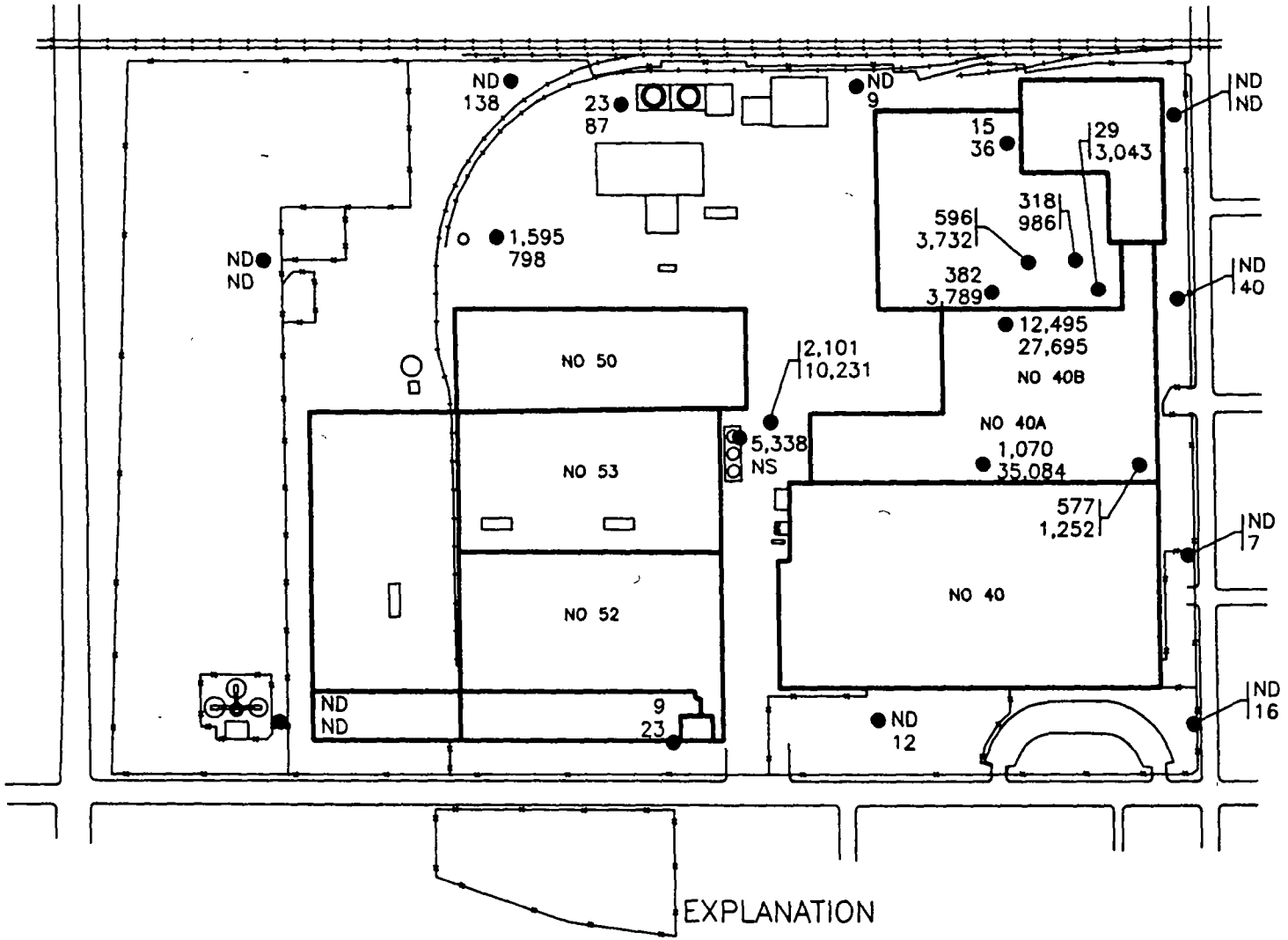
●	APPROXIMATE RECON℠ SAMPLE LOCATION
116	TOTAL VOCs DETECTED IN SOIL GAS USING RECON℠ AT 0 – 1' (ug/L)
172	TOTAL VOCs DETECTED IN SOIL GAS USING RECON℠ AT 3 – 4' (ug/L)
382	TOTAL VOCs DETECTED IN SOIL GAS USING RECON℠ AT 6 – 7' (ug/L)
ND	NOT DETECTED

0 80 160

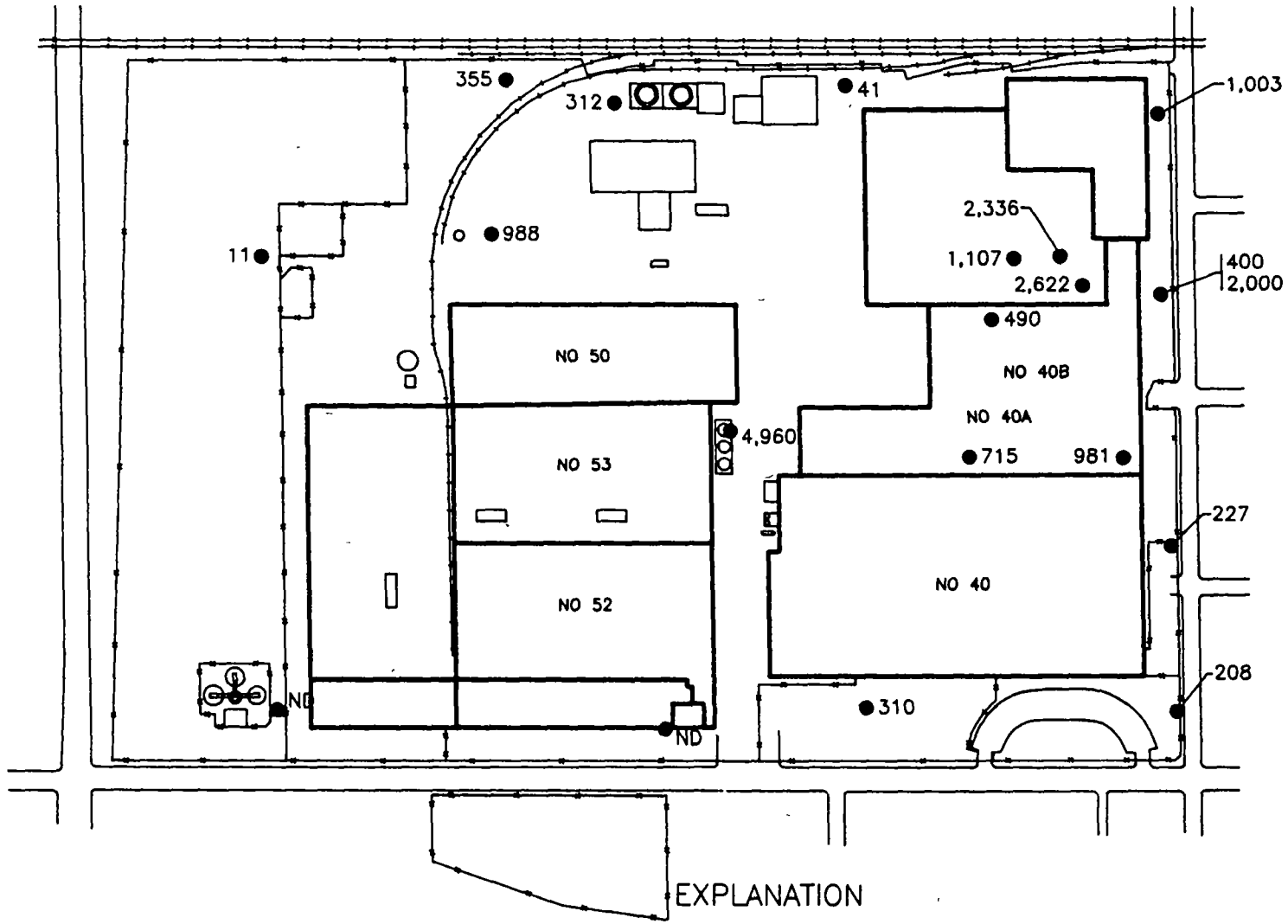
SCALE IN FEET

N

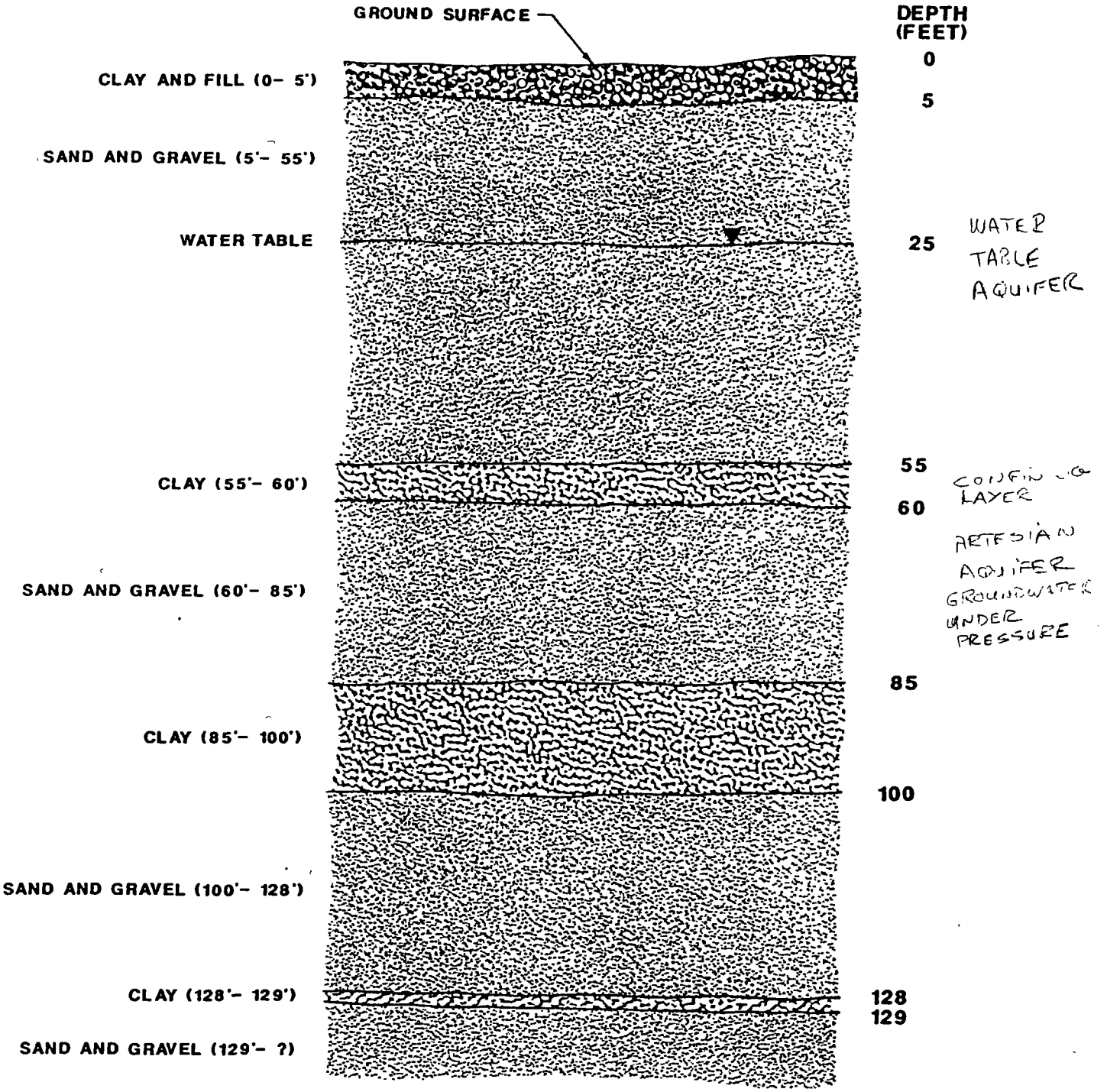
TOTAL VOCs IN SOIL GAS
DAYTON THERMAL PRODUCTS PLANT



TOTAL VOCs IN GROUNDWATER
DAYTON THERMAL PRODUCTS PLANT

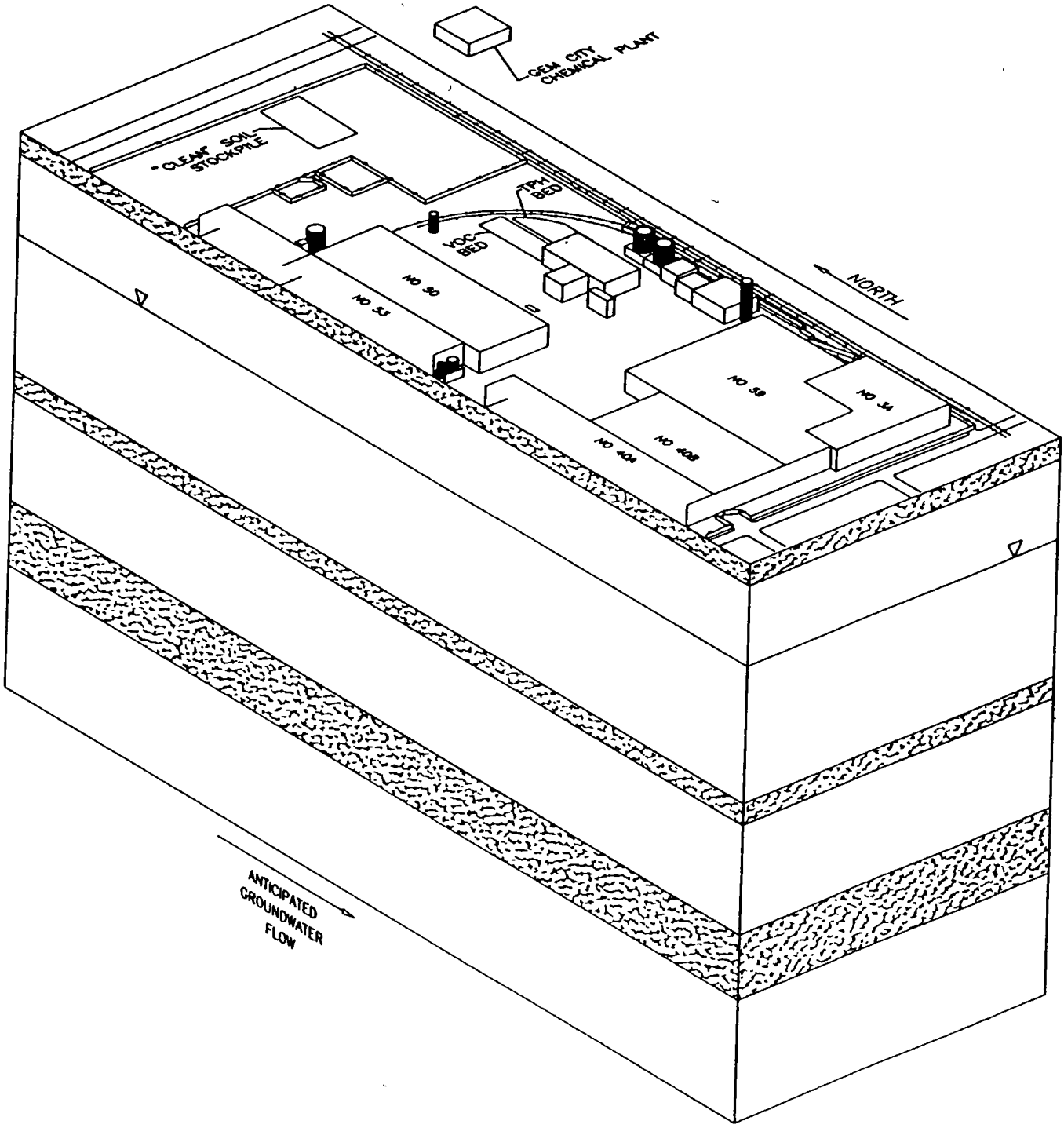


CONCEPTUAL SUBSURFACE CONDITIONS
DAYTON THERMAL PRODUCTS PLANT



LATERALLY CONTINUOUS

CONCEPTUAL SUBSURFACE CONDITIONS
DAYTON SITE



ADDITIONAL WORK RECOMMENDED

- Prevent Identified Sources From Contaminating Aquifer — Source Control
  - 1,1,1-TCA tanks south of Building 59
  - Building 40B

- Evaluate Subsurface Conditions
  - Vertical profile and lateral extent of sediments. Delineate aquifer and semi-confining layer boundaries.
  - Aquifer, vadose zone and semi-confining layer properties:
    1. Air flow for soil venting
    2. Groundwater flow in water table and first semi-confined aquifer for groundwater remediation
    3. Semi-confining layer properties and orientation for non-aqueous phase contaminant flow

- Evaluate Risks and Options

- Select Cost-Effective Alternative(s)

SOURCE CONTROL
1,1,1-TCA TANKS

OPTIONS

1. Tank System as a continuing source

   - Remove from service
   - Integrity Test
     - visual inspection
     - corrosion
     - improve material management

2. Subsurface Contamination

   - Soil

     - Excavation/removal (RCRA hazardous waste)

       Assume 100 x 100 x 25 ~ 9,000 yards
       $1,200/cubic yard for incineration

       ~$11 Million

     - Venting (minimize RCRA hazardous waste)

       ~$50,000 as part of program outlined below

   - Groundwater

     - To be selected as part of site-wide evaluation

SOURCE CONTROL
BUILDING 40B

OPTIONS

1. Building as a Continuing Source

   - Remove from service
     - improve material management practices
     - discontinue use of solvents
     - halt production

   - Isolate from environment
     - venting system discussed below

2. Subsurface Contamination

   - Soil
     - 127,000 cubic yards may be affected
     - All subsurface work will generate RCRA hazardous waste (requires handling at $1,200-1,500/cubic yard)
     - Excavation/Removal
       All RCRA hazardous waste - $152 million
     - Venting
       Minimize generation of RCRA hazardous waste - $0.7-$1.5 million

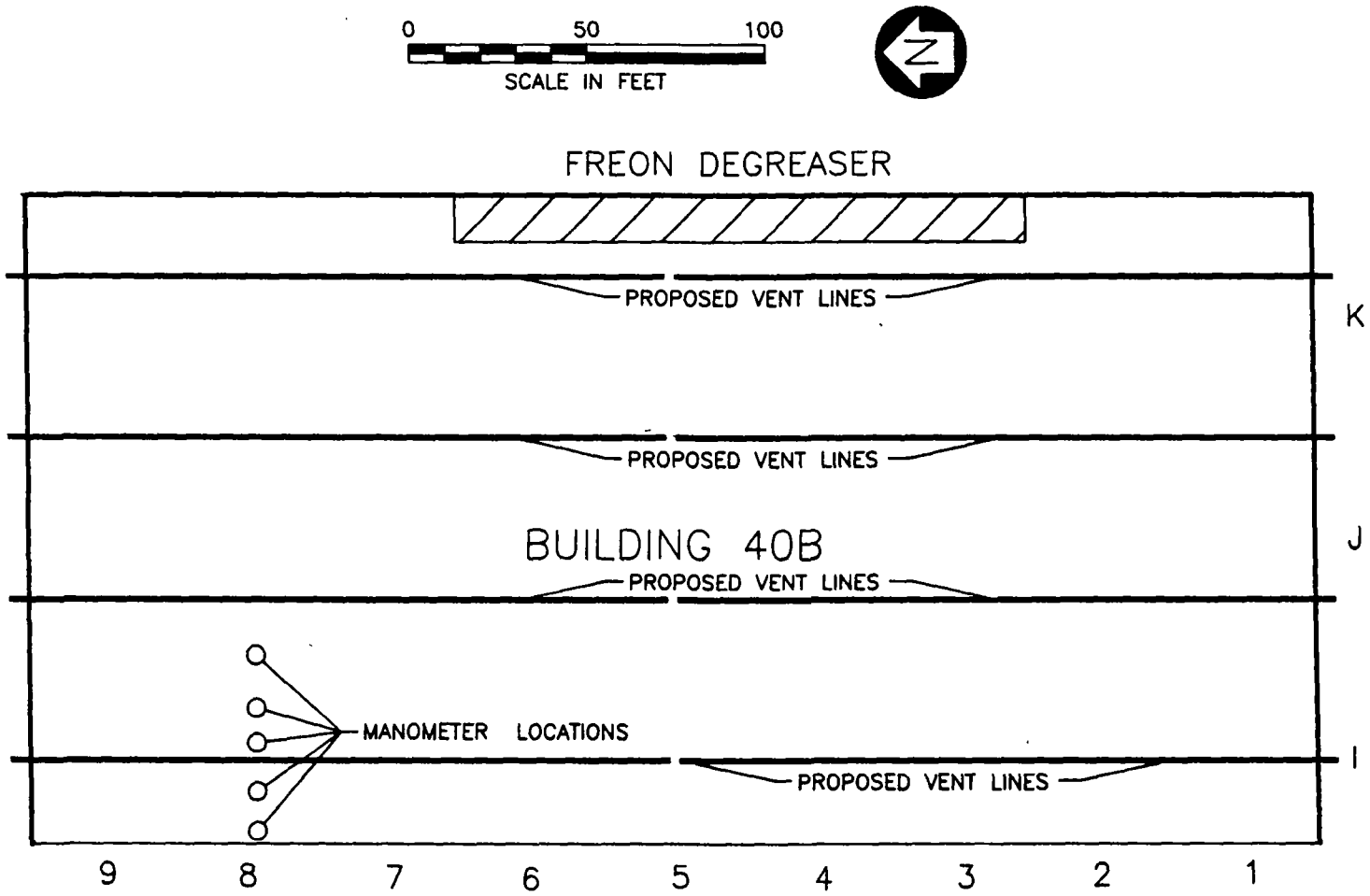
       a. Vertical - not most cost-effective option due to site logistics

       b. Horizontal
          - from surface - infeasible logistically
          - from outside of building

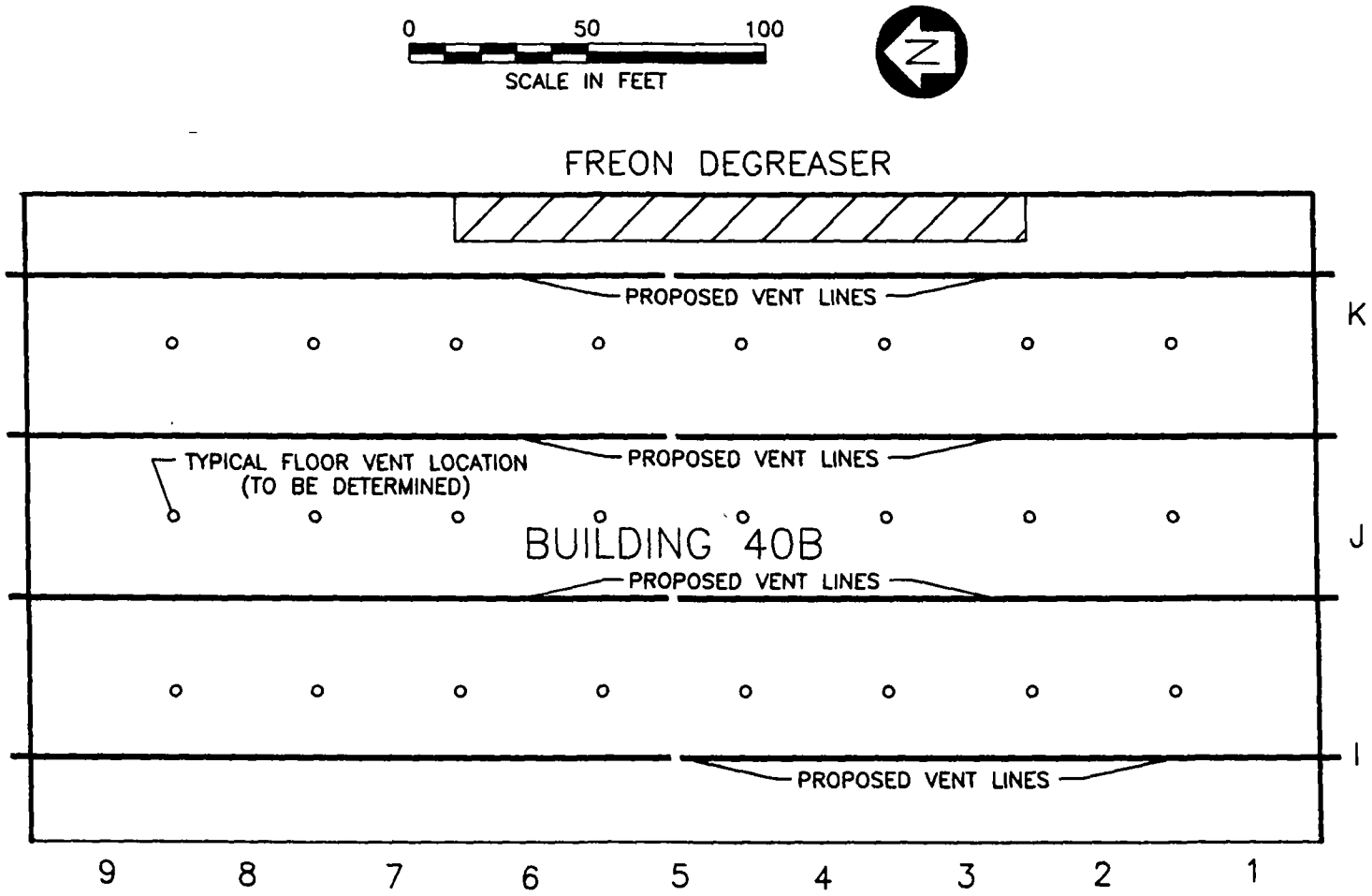
       Program outlined below

   - Groundwater
     - To be selected as part of site-wide evaluation

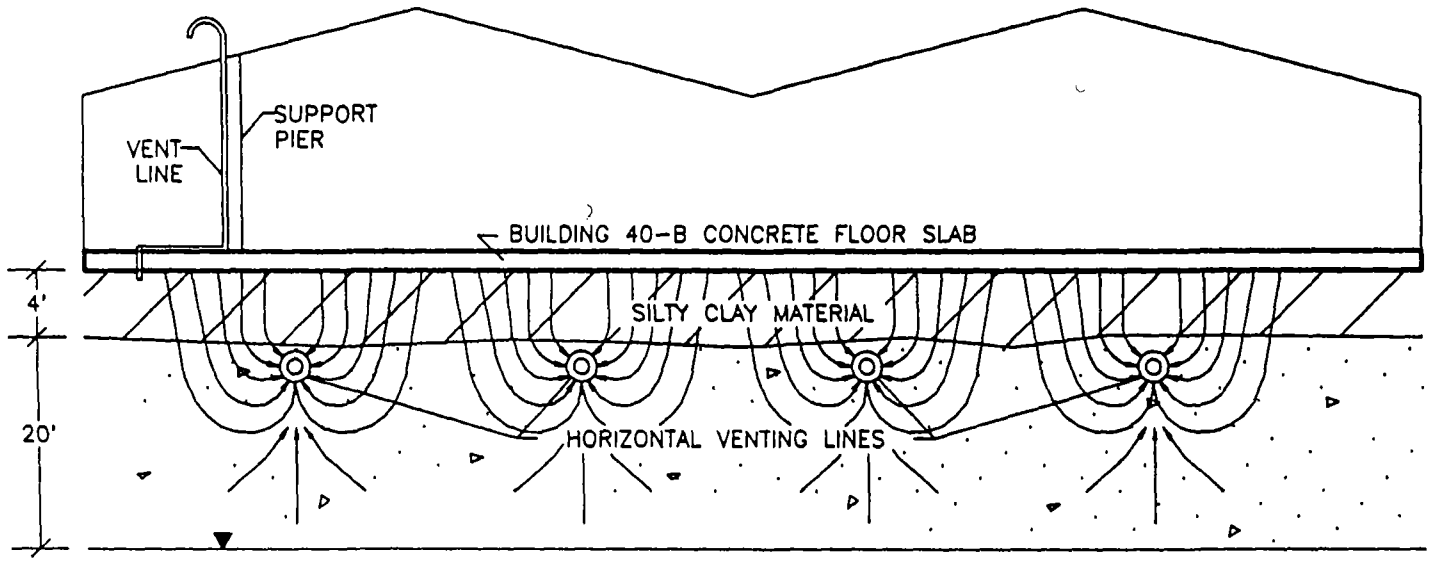
PROPOSED LOCATION FOR HORIZONTAL VENTING LINES HORIZONTAL SOIL VENTING SYSTEM



TYPICAL FLOOR VENTING LOCATION
HORIZONTAL SOIL VENTING SYSTEM



CROSS SECTION DIAGRAM OF PROPOSED VENTING SYSTEM



NOT TO SCALE

SUBSURFACE ASSESSMENT AND CLEANUP EVALUATION ANTICIPATED SCOPE OF WORK

- Evaluate subsurface soil condition in area of 1,1,1-TCA tanks and storage area east of Building 50
  - VOCs
  - Grain size distribution
  - Response testing (venting test)
    - to evaluate, design, and cost soil venting as a remedial alternative

- Advance deep (100 feet) boreholes to evaluate continuity of stratigraphy
  - Six boreholes through base of "confined" saturated zone
  - Evaluate data requirements
  - Install wells

- Advance shallow (55 feet) boreholes to evaluate water table and continuity of confining zone
  - Six boreholes to base of first "confining" layer
  - Evaluate data requirements
  - Install wells

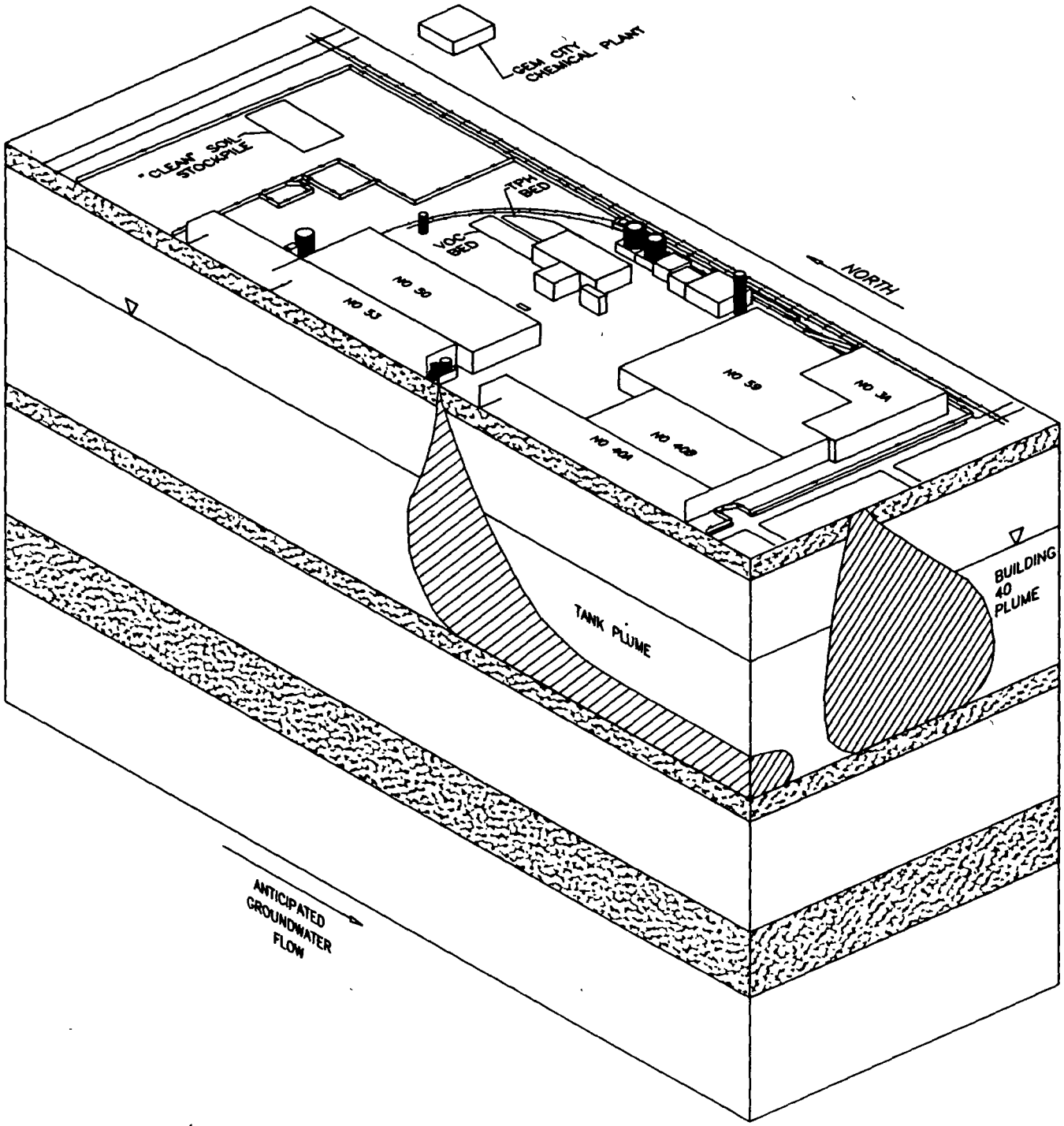
- Evaluate groundwater and properties of water table and first "confined" zone
  - Flow direction
  - Water quality (VOCs plus parameters required for remediation)
  - Response testing (pumping test)
    - to select and design appropriate remedial method

- Evaluate cleanup standards
  - ARARs
  - RCRA Corrective Action Levels
  - Health-risk based levels

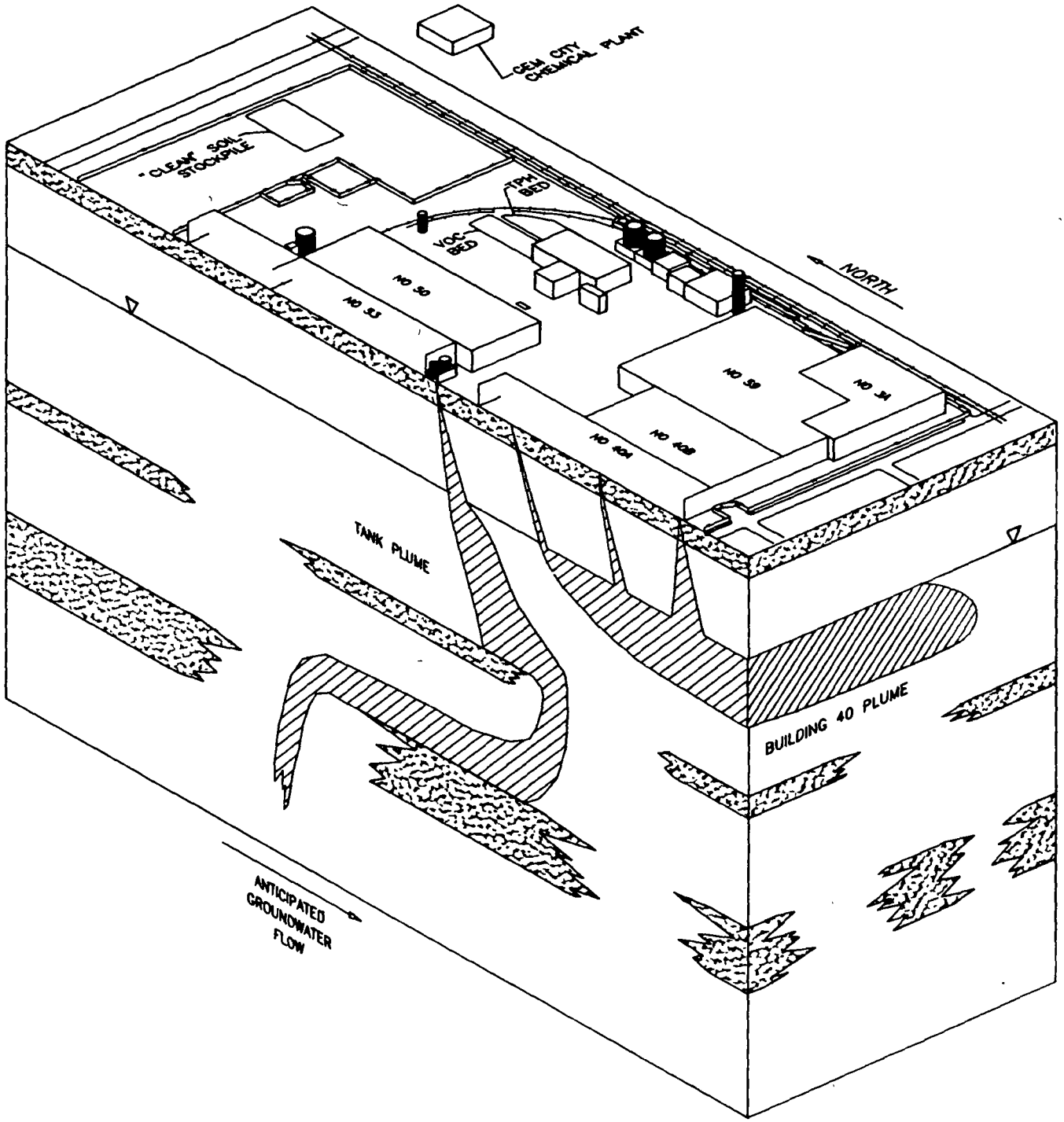
- Engineering evaluation
  - Soil
  - Groundwater

- Recommendations

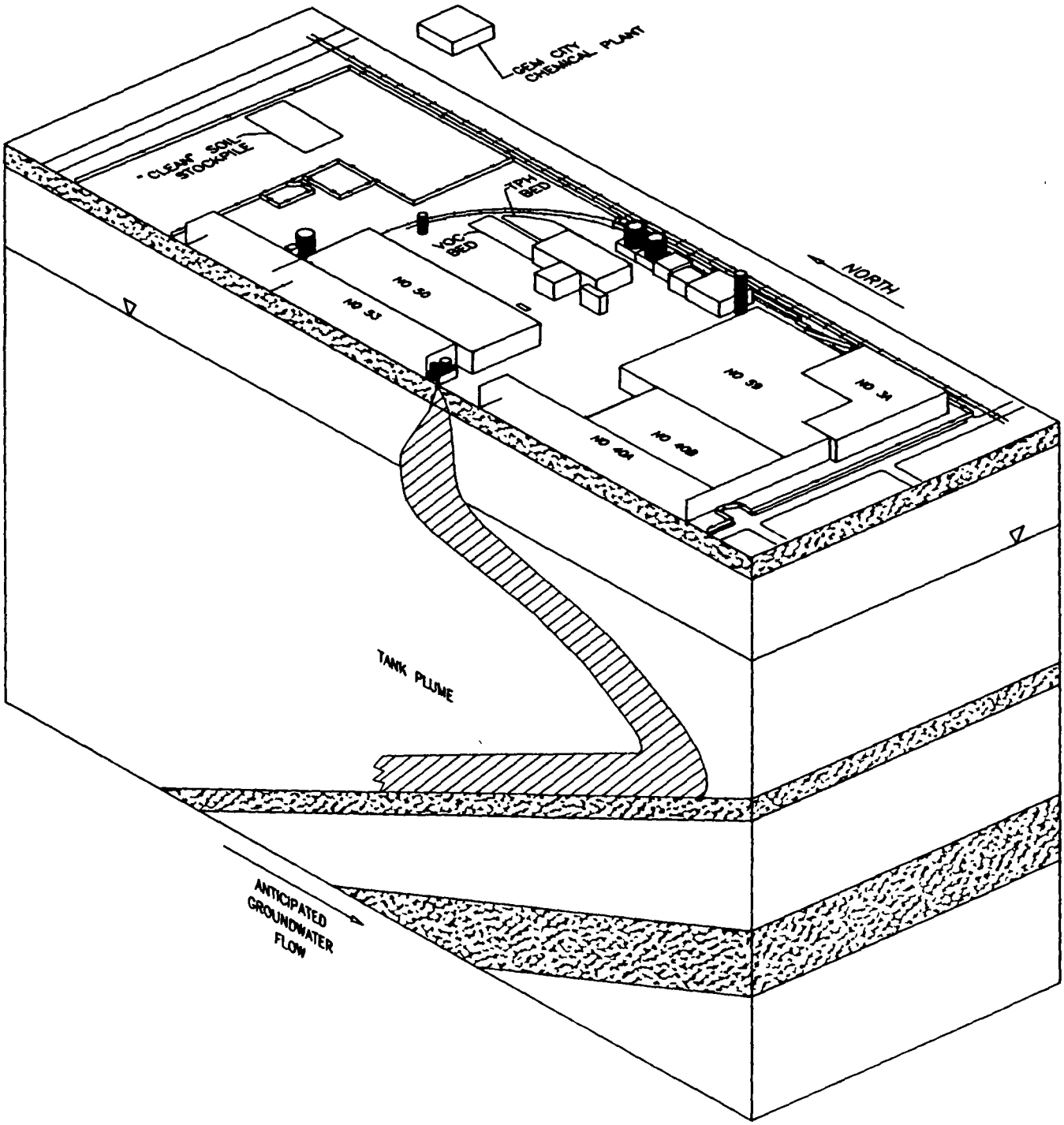
CONCEPTUAL SUBSURFACE CONDITIONS
DAYTON SITE
"HORIZONTAL" CONFINING LAYER



CONCEPTUAL SUBSURFACE CONDITIONS
DAYTON SITE
"LEAKY" CONFINING LAYER



CONCEPTUAL SUBSURFACE CONDITIONS
DAYTON SITE
"TILTING" CONFINED LAYER



DRIVING FORCES/CONCERNS

- Release of hazardous substance/waste to the environment

- Affects groundwater above federally promulgated maximum contaminant levels (MCLs) (drinking water)

- Previously pumped contaminated Power House well for 90 days @ 1 million gallons per day - no change in contaminant level (large volume affected)

- Potential for off-site migration
  - increases difficulty ($) of recovery

- Minimize potential Superfund "PRP" responsibility/ participation of Dayton aquifer remediation

- Evaluate "Island of Purity" concept
  - remediate media affected by plant

RIGHT-OF-ENTRY

The City of Dayton, Ohio, hereby grants to DaimlerChrysler, a right-of-entry over and upon the property located at 520 Kiser Street, Dayton, Ohio. Said Right-of-Entry shall be granted from April 4, 2001, through October 4, 2001, inclusive.

To the extent permitted by law, the City of Dayton will hold DaimlerChrysler harmless from any liability resulting from claims of trespass.

DaimlerChrysler hereby agrees to hold harmless and indemnify the City of Dayton for any loss, injury or damages to either themselves or their invitees by or resulting from entry onto the property, and further agrees to surrender possession of the premises and repair any damage to the existing building or property and to restore the area, if necessary, at their own expense, to the extent caused by DaimlerChrysler's negligence or intentional acts.

Jo Wilson

Jo Wilson, Manager
Division of Facilities Management
City of Dayton

4/4/01
Date

Agent for DaimlerChrysler

4.4.2001
Date

rtentry/sb

Department of Public Works
Division of Facilities Management
(937) 333-4001
FAX 333-4002

City of Dayton, Ohio
City Hall
101 West Third Street
P O Box 22
Dayton, OH 45401

www daytongov com

April 5, 2001

Mr. Gary Stanczuk
DaimlerChrysler Corporation
CIMS 482-00-51
1000 Chrysler Drive
Auburn Hills, Michigan 48326

Sent original Back
4-11-01

Dear Mr. Stanczuk:

Enclosed are two originals of the Right-of-Entry from the City of Dayton for 520 Kiser Street.

Please sign each Right-of-Entry and return one original to our office.

Thank you for your continued patience in this process. If you have any questions please call me at (937) 333-4016.

Sincerely,

Stephanie Bryant

Stephanie Bryant, Property Clerk
Facilities Management

/sb

Enclosures

DAIMLERCHRYSLER

February 26, 2001

DaimlerChrysler Corporation

Mr. Tom Rouse
Heidelburg Distribution Co.
40 S. Main Street
Dayton, OH 45402

Re: Access for Hydrogeological Investigation

Dear Mr. Rouse:

DaimlerChrysler Corporation appreciates your cooperation in executing the Access Agreement dated October 10, 2000, which allows us to install 4 groundwater monitoring wells on your properties located at 969 Deeds Avenue, north of Leo Street and 1247 Leo Street, south of Leo Street in Dayton, Ohio. As we previously discussed, DaimlerChrysler is conducting a voluntary hydrogeological investigation regarding the possible presence of historic industrial solvents in shallow ground water in the vicinity of the Dayton Thermal Products plant.

We anticipate starting installation of the wells March 2001. We will contact you several days prior to the specific date we would like to mobilize to your site to aide in coordination. The first wells will be installed in Claridge Park located at Webster and Leonard Streets. During the drilling of these wells you will be invited to a public meeting for an update and to view the drilling operation (weather permitting).

Enclosed for your records are a copy of the executed Access Agreement and an aerial photo showing the approximate well locations. The legal descriptions of the parcels involved will be sent under separate cover.

Thank you for your consideration and cooperation in this matter. In the meantime, please feel free to contact me at 248-576-7354 or Gary Stanczuk of my staff at 248-576-7365 with any comments or questions you may have regarding the planned scope of work.

Sincerely,

Michael J. Curry
Remediation Program Manager

DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-51
Auburn Hills MI USA 48326-2757

ACCESS AGREEMENT

THIS ACCESS AGREEMENT ("Agreement") is made this 10TH day of OCTOBER, 2000, by and between DaimlerChrysler Corporation, whose address is 1000 Chrysler Drive, Auburn Hills, MI 48326 and VAN Z. REALTY COMPANY ("Owner"), whose address is 40 SOUTH MAIN STREET DAYTON, OHIO 45402, and a legal description of which is attached as Exhibit A ("Owner's Property").

In consideration of the mutual promises and covenants contained in this Agreement, the receipt and sufficiency of which is acknowledged by both parties, Owner and DaimlerChrysler Corporation agree as follows:

1. Owner grants to DaimlerChrysler Corporation, its employees, and agents (collectively, "DaimlerChrysler") access to Owner's Property to place monitoring wells. The right of access that Owner grants to DaimlerChrysler also includes access to maintain and repair the well, as well as to take periodic samples of groundwater from the well.

2. After installing the well, DaimlerChrysler will promptly restore Owner's Property to its original condition to the extent possible, excluding well itself. DaimlerChrysler will cooperate with Owner in reasonable efforts to camouflage the well.

3. DaimlerChrysler will conduct the activities described in paragraph 1 of this Agreement during reasonable business hours, and will attempt to give Owner 48 hours notice by telephone before entering Owner's Property to conduct these activities. DaimlerChrysler will promptly provide Owner with a copy of the results of sampling conducted on its property if Owner requests those results in writing.

4. Owner agrees that the well will be locked at all times, except when DaimlerChrysler unlocks the well to conduct sampling, or to maintain or repair the well. Owner agrees that it will not interfere, tamper with or cause damage to the well.

5. DaimlerChrysler will defend and indemnify Owner from and against any and all claims made by any third party related to the installation, maintenance, repair and existence of the well on Owner's Property.

6. This Agreement will continue until DaimlerChrysler terminates it. If DaimlerChrysler has not sampled, repaired or conducted maintenance on the well for a period of two years after its installation, then Owner may request, in writing,

that the well be removed and this Agreement terminated. DaimlerChrysler will then have 60 days to respond in writing to either continue or terminate the Agreement. Upon termination of this Agreement, DaimlerChrysler shall promptly remove the well and restore Owner's Property to its original condition to the extent possible.

7. Any notices required under this Agreement shall be sent to :

If to DaimlerChrysler:
Gary Stanczuk
DaimlerChryslerCorporation
CIMS 482-00-51
1000 Chrysler Drive
Auburn Hills, MI 48326

If to Owner:
Thomas A. Kaup
40 South Main Street
Dayton, OHIO 45402

8. This Agreement is governed by the laws of the State of Ohio. If any provision of this Agreement is deemed invalid, such invalidity shall have no effect on the other provisions, which shall remain in full force and effect. This Agreement shall be binding on and inure to the benefit of the parties' successors and assigns.

9. This Agreement may be executed in counterparts, which shall together constitute the entire document. If DaimlerChrysler deems it necessary, DaimlerChrysler may record this Agreement.

IN WITNESS WHEREOF, the parties have set their hands on this 10TH day of October, 2000.

WITNESSES

David P. Bittner
By: David P. Bittner

Susan B. Hawkins
By: Susan B. Hawkins

OWNER

Vonta Realty Company
By: Thomas A. Kovas
Its: Vice President

STATE OF)
) **SS**
COUNTY OF)

BE IT REMEMBERED that on this 10TH day of October, 2000, before me, a Notary Public, personally came Thomas A. Kovas, and acknowledged that he/she did sign the foregoing instrument as his voluntary act and deed for the uses and purposes therein mentioned.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my official seal on the day and year last aforesaid.

Debra S. Medlock
Debra S Medlock, Notary Public
Hamilton County, OH
My Commission expires:_____

DEBRA S MEDLOCK
Notary Public, State of Ohio
My Commission Expires July 18, 2001

WITNESSES

By: Michael J. Curry

By. Gary M Staiczak

DAIMLERCHRYSLER CORPORATION

By:

Its: Gregory M. Rose

STATE OF MICHIGAN)
) **SS**
COUNTY OF OAKLAND)

On this 29th day of November, 2000, before me, the undersigned, a Notary Public in and for said County and State personally appeared Gregory M. Rose to me personally known, who being sworn did say that he is Senior Manager of the Corporation in the foregoing instrument, and that the seal thereto affixed is the Corporate Seal of said Corporation and that said instrument was signed and sealed on behalf of said Corporation by authority of its Board of Directors and said Gregory M. Rose acknowledged said instrument to be the free act and deed of said Corporation.

WITNESS my hand and Notarial Seal subscribed and affixed in said County and State, the day and year in this certificate above written.

Frances Reinhardt

FRANCES REINHARDT, Notary Public

MACOMB County, MICHIGAN

My Commission expires: 8-30-2003

Acting in and for Oakland County

This instrument was prepared by and should be returned to:
Kathleen M. Hennessey
DaimlerChrysler Corporation
1000 Chrysler Drive
Auburn Hills, MI 48326
(248) 512-4116

EXHIBIT A

Legal Description for Parcel ID # R72-057-08-0011:

And being part of Section 5, Town 1, R7, MRS and being part of a 6.905 acre tract conveyed to the Gem City Boiler Company, and recorded in Deed Book 247, Page 388, of the Deed Records of said county and being more particularly described as follows:

Beginning at the intersection of the centerline of Deeds Avenue and the centerline of Leo Street, thence westwardly with the centerline of Leo Street 287.18 ft. to the east right of way line of the Baltimore and Ohio Railway Company as recorded in Deed Book 261, Page 501; thence Northwardly with the said right of way line 175 feet to a point; thence Eastwardly on a line parallel to the centerline of Leo Steet 287.66 feet to a point in the centerline of Deeds Avenue; thence Southwardly with said extended centerline 175 feet to the place of beginning containing 1.15 acres more or less.

Subject however, to one half the right of way of Deeds Avenue and Leo Street both of which streets are 50 ft. in width and subject also to the right of way for pipe line to the Dayton Power and Light Company by deed from The W. B. W. Tool Company dated March 21, 1946 and recorded in Vol. 1147, page 467, of the Deed Records of Montgomery County, Ohio, excluding from the above described land the two tracts of land conveyed by The W. B. W. Tool Company to the City of Dayton, Ohio for street purposes by deed dated March 21, 1946 and recorded in Vol. 1155, page 83, of the Deed Records of Montgomery County, Ohio.

EXHIBIT A

Legal Description for Parcel ID # R72-057-08-0011:

And being part of Section 5, Town 1, R7, MRS and being part of a 6.905 acre tract conveyed to the Gem City Boiler Company, and recorded in Deed Book 247, Page 388, of the Deed Records of said county and being more particularly described as follows:

Beginning at the intersection of the centerline of Deeds Avenue and the centerline of Leo Street, thence westwardly with the centerline of Leo Street 287.18 ft. to the east right of way line of the Baltimore and Ohio Railway Company as recorded in Deed Book 261, Page 501; thence Northwardly with the said right of way line 175 feet to a point; thence Eastwardly on a line parallel to the centerline of Leo Steet 287.66 feet to a point in the centerline of Deeds Avenue; thence Southwardly with said extended centerline 175 feet to the place of beginning containing 1.15 acres more or less.

Subject however, to one half the right of way of Deeds Avenue and Leo Street both of which streets are 50 ft. in width and subject also to the right of way for pipe line to the Dayton Power and Light Company by deed from The W. B. W. Tool Company dated March 21, 1946 and recorded in Vol. 1147, page 467, of the Deed Records of Montgomery County, Ohio, excluding from the above described land the two tracts of land conveyed by The W. B. W. Tool Company to the City of Dayton, Ohio for street purposes by deed dated March 21, 1946 and recorded in Vol. 1155, page 83, of the Deed Records of Montgomery County, Ohio.

DAIMLERCHRYSLER

February 26, 2001

DaimlerChrysler Corporation

Ms. Susan Corrigan
Mr. Edward Corrigan
Kelcor Machine & Tool
1523 Milburn Street
Dayton OH 45404

Re: Access for Hydrogeological Investigation

Dear Ms. Corrigan & Mr. Corrigan:

DaimlerChrysler Corporation appreciates your cooperation in executing the Access Agreement dated September 27, 2000, which allows us to install a groundwater monitoring well on your property located at 1523 Milburn Street in Dayton, Ohio. As we previously discussed, DaimlerChrysler is conducting a voluntary hydrogeological investigation regarding the possible presence of historic industrial solvents in shallow ground water in the vicinity of the Dayton Thermal Products plant.

We would like to begin installing the wells on your property and in the community this March. We will contact you several days prior to the specific date we would like to mobilize to your site. The first wells will be installed in Claridge Park located at Webster and Leonard Streets. During the drilling of these wells you will be invited to a public meeting for an update and (weather permitting) to view the drilling operation.

Enclosed for your records are a copy of the executed Access Agreement, Legal Description of the property, and an aerial photo showing the approximate well location.

Thank you for your consideration and cooperation in this matter. In the meantime, please feel free to contact me at 248-576-7354 or Gary Stanczuk of my staff at 248-576-7365 with any comments or questions you may have regarding the planned scope of work.

Sincerely,

Michael J. Curry
Remediation Program Manager

DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-51
Auburn Hills MI USA 48326-2757

ACCESS AGREEMENT

THIS ACCESS AGREEMENT ("Agreement") is made this 20 day of Sept, 2000, by and between DaimlerChrysler Corporation, whose address is 1000 Chrysler Drive, Auburn Hills, MI 48326 and _____ ("Owner"), whose address is 1523 Mt. Clair Ave Dayton Oh. 45406, and a legal description of which is attached as Exhibit A ("Owner's Property").

In consideration of the mutual promises and covenants contained in this Agreement, the receipt and sufficiency of which is acknowledged by both parties, Owner and DaimlerChrysler Corporation agree as follows:

1. Owner grants to DaimlerChrysler Corporation, its employees, and agents (collectively, "DaimlerChrysler") access to Owner's Property to place monitoring wells. The right of access that Owner grants to DaimlerChrysler also includes access to maintain and repair the well, as well as to take periodic samples of groundwater from the well.

2. After installing the well, DaimlerChrysler will promptly restore Owner's Property to its original condition to the extent possible, excluding well itself. DaimlerChrysler will cooperate with Owner in reasonable efforts to camouflage the well.

3. DaimlerChrysler will conduct the activities described in paragraph 1 of this Agreement during reasonable business hours, and will attempt to give Owner 48 hours notice by telephone before entering Owner's Property to conduct these activities. DaimlerChrysler will promptly provide Owner with a copy of the results of sampling conducted on its property if Owner requests those results in writing.

4. Owner agrees that the well will be locked at all times, except when DaimlerChrysler unlocks the well to conduct sampling, or to maintain or repair the well. Owner agrees that it will not interfere, tamper with or cause damage to the well.

5. DaimlerChrysler will defend and indemnify Owner from and against any and all claims made by any third party related to the installation, maintenance, repair and existence of the well on Owner's Property.

6. This Agreement will continue until DaimlerChrysler terminates it. If DaimlerChrysler has not sampled, repaired or conducted maintenance on the well for a period of two years after its installation, then Owner may request, in writing,

that the well be removed and this Agreement terminated. DaimlerChrysler will then have 60 days to respond in writing to either continue or terminate the Agreement. Upon termination of this Agreement, DaimlerChrysler shall promptly remove the well and restore Owner's Property to its original condition to the extent possible.

7. Any notices required under this Agreement shall be sent to :

If to DaimlerChrysler: Gary Stanczuk
DaimlerChryslerCorporation
CIMS 482-00-51
1000 Chrysler Drive
Auburn Hills, MI 48326

If to Owner: _____
_____
_____
_____

8. This Agreement is governed by the laws of the State of Ohio. If any provision of this Agreement is deemed invalid, such invalidity shall have no effect on the other provisions, which shall remain in full force and effect. This Agreement shall be binding on and inure to the benefit of the parties' successors and assigns.

9. This Agreement may be executed in counterparts, which shall together constitute the entire document. If DaimlerChrysler deems it necessary, DaimlerChrysler may record this Agreement.

IN WITNESS WHEREOF, the parties have set their hands on this 27 day of September, 2000.

WITNESSES

Patricia Logan
By: _____

Teresa M. Rose
By: _____

OWNER

Susan L. Corrigan
Edward M Corrigan
By: _____
Its: _____

STATE OF)
) **SS**
COUNTY OF)

BE IT REMEMBERED that on this 27th day of Sept., 2000, before me, a Notary Public, personally came Susan L. Corrigan Edward M Corrigan, and acknowledged that he/she did sign the foregoing instrument as his voluntary act and deed for the uses and purposes therein mentioned.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my official seal on the day and year last aforesaid.

Patricia Logan
_____, Notary Public
Miami County, Ohio
My Commission expires: May 15, 2002

PATRICIA LOGAN, Notary Public
In and for the State of Ohio
My Commission Expires May 15, 2002

WITNESSES

By: Michael J Furry

By: Gary M Stalczyk

DAIMLERCHRYSLER CORPORATION

By:

Its: Gregory M. Rose

STATE OF MICHIGAN)
) **SS**
COUNTY OF OAKLAND)

On this 29th day of November, ~~19~~ 2000, before me, the undersigned, a Notary Public in and for said County and State personally appeared Gregory M Rose to me personally known, who being sworn did say that he is Senior Manager of the Corporation in the foregoing instrument, and that the seal thereto affixed is the Corporate Seal of said Corporation and that said instrument was signed and sealed on behalf of said Corporation by authority of its Board of Directors and said Gregory M. Rose acknowledged said instrument to be the free act and deed of said Corporation.

WITNESS my hand and Notarial Seal subscribed and affixed in said County and State, the day and year in this certificate above written.

Frances Reinhardt

FRANCES REINHARDT, Notary Public

MACOMB County, MICHIGAN

My Commission expires: 8-30-2003

Acting in and for Oakland County

This instrument was prepared by and should be returned to:
Kathleen M. Hennessey
DaimlerChrysler Corporation
1000 Chrysler Drive
Auburn Hills, MI 48326
(248) 512-4116

EXHIBIT A

Legal Description for Parcel ID # R72-057-01-0040:

Situate in the County of Montgomery in the State of Ohio and in the City of Dayton and being Lots Numbered 39368, 39369, 39370 and 39371 of the consecutive numbered lots on the Revised Plat of the said City of Dayton, Ohio.

DAIMLERCHRYSLER

February 26, 2001

DaimlerChrysler Corporation

Mr. Dave Rich
American Legion Post 619
722 Hart Street
Dayton, OH 45404-1953

Re: Access for Hydrogeological Investigation

Dear Mr. Rich:

DaimlerChrysler Corporation appreciates your cooperation in executing the Access Agreement dated June 21,2000, which allows us to install two groundwater monitoring wells on your property located at 1510 Webster Street in Dayton, Ohio. As we previously discussed, DaimlerChrysler is conducting a voluntary hydrogeological investigation regarding the possible presence of historic industrial solvents in shallow ground water in the vicinity of the Dayton Thermal Products plant.

We would like to begin installing the wells on your property and in the community this March. We will contact you several days prior to the specific date we would like to mobilize to your site. The first wells will be installed in Claridge Park located at Webster and Leonard Streets. During the drilling of these wells you will be invited to a public meeting for an update and (weather permitting) to view the drilling operation.

Enclosed for your records are a copy of the executed Access Agreement, Legal Description of the property, and an aerial photo showing the approximate well locations.

Thank you for your consideration and cooperation in this matter. In the meantime, please feel free to contact me at 248-576-7354 or Gary Stanczuk of my staff at 248-576-7365 with any comments or questions you may have regarding the planned scope of work.

Sincerely,

Michael J. Curry
Remediation Program Manager

DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-51
Auburn Hills MI USA 48326-2757

ACCESS AGREEMENT

THIS ACCESS AGREEMENT ("Agreement") is made this 21 day of June, 2000, by and between DaimlerChrysler Corporation, whose address is 1000 Chrysler Drive, Auburn Hills, MI 48326 and AMERICAN LEGION TONY STEIN POST 619 ("Owner"), whose address is 1510 WEBSTER ST. DAYTON OHIO 45404, and a legal description of which is attached as Exhibit A ("Owner's Property").

In consideration of the mutual promises and covenants contained in this Agreement, the receipt and sufficiency of which is acknowledged by both parties, Owner and DaimlerChrysler Corporation agree as follows:

1. Owner grants to DaimlerChrysler Corporation, its employees, and agents (collectively, "DaimlerChrysler") access to Owner's Property to place monitoring wells. The right of access that Owner grants to DaimlerChrysler also includes access to maintain and repair the well, as well as to take periodic samples of groundwater from the well.

2. After installing the well, DaimlerChrysler will promptly restore Owner's Property to its original condition to the extent possible, excluding well itself. DaimlerChrysler will cooperate with Owner in reasonable efforts to camouflage the well.

3. DaimlerChrysler will conduct the activities described in paragraph 1 of this Agreement during reasonable business hours, and will attempt to give Owner 48 hours notice by telephone before entering Owner's Property to conduct these activities. DaimlerChrysler will promptly provide Owner with a copy of the results of sampling conducted on its property if Owner requests those results in writing.

4. Owner agrees that the well will be locked at all times, except when DaimlerChrysler unlocks the well to conduct sampling, or to maintain or repair the well. Owner agrees that it will not interfere, tamper with or cause damage to the well.

5. DaimlerChrysler will defend and indemnify Owner from and against any and all claims made by any third party related to the installation, maintenance, repair and existence of the well on Owner's Property.

6. This Agreement will continue until DaimlerChrysler terminates it. If DaimlerChrysler has not sampled, repaired or conducted maintenance on the well for a period of two years after its installation, then Owner may request, in writing,

that the well be removed and this Agreement terminated. DaimlerChrysler will then have 60 days to respond in writing to either continue or terminate the Agreement. Upon termination of this Agreement, DaimlerChrysler shall promptly remove the well and restore Owner's Property to its original condition to the extent possible.

7. Any notices required under this Agreement shall be sent to :

If to DaimlerChrysler:
Gary Stanczuk
DaimlerChryslerCorporation
CIMS 482-00-51
1000 Chrysler Drive
Auburn Hills, MI 48326

If to Owner:
C/O DAVE Rich
AMERICAN LEGION TONY STEIN POST 619
1510 WEBSTER ST.
DAYTON OHIO 45404-1953

8. This Agreement is governed by the laws of the State of Ohio. If any provision of this Agreement is deemed invalid, such invalidity shall have no effect on the other provisions, which shall remain in full force and effect. This Agreement shall be binding on and inure to the benefit of the parties' successors and assigns.

9. This Agreement may be executed in counterparts, which shall together constitute the entire document. If DaimlerChrysler deems it necessary, DaimlerChrysler may record this Agreement.

IN WITNESS WHEREOF, the parties have set their hands on this 21 day of June, 2000.

WITNESSES

By: _____

By: _____

OWNER

American Legion Post 619

By: David C. Rich Chairman Board

Its: _____

STATE OF Ohio)
) **SS**
COUNTY OF Montgomery)

BE IT REMEMBERED that on this 21 day of June, 2000, before me, a Notary Public, personally came David C Rich, and acknowledged that he/she did sign the foregoing instrument as his voluntary act and deed for the uses and purposes therein mentioned.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my official seal on the day and year last aforesaid.

_____, Notary Public

_____ County, _____

My Commission expires: _____

DEBORAH COOL-LLORENS
Notary Public, State of Ohio
My Commission Expires May 27, 2003

WITNESSES

By: Michael J. Curry

By: Gary M. Stanczyk

DAIMLERCHRYSLER CORPORATION

By:

Its: Gregory M Rose

STATE OF MICHIGAN)
) SS
COUNTY OF OAKLAND)

On this 29th day of November, ~~19~~ 2000, before me, the undersigned, a Notary Public in and for said County and State personally appeared Gregory M. Rose to me personally known, who being sworn did say that he is Senior Manager of the Corporation in the foregoing instrument, and that the seal thereto affixed is the Corporate Seal of said Corporation and that said instrument was signed and sealed on behalf of said Corporation by authority of its Board of Directors and said Gregory M. Rose acknowledged said instrument to be the free act and deed of said Corporation.

WITNESS my hand and Notarial Seal subscribed and affixed in said County and State, the day and year in this certificate above written.

Frances Reinhardt

FRANCES REINHARDT, Notary Public

MACOMB County, MICHIGAN

My Commission expires: 8-30-2013

Acting in and for Oakland County

This instrument was prepared by and should be returned to:
Kathleen M. Hennessey
DaimlerChrysler Corporation
1000 Chrysler Drive
Auburn Hills, MI 48326
(248) 512-4116

EXHIBIT A

Legal Description for Parcel ID # R72-057-01-003:

Being Lot Numbered THIRTY NINE THOUSAND THREE HUNDRED THIRTY ONE (39331) of the consecutive numbers of lots on the revised plat of the City of Dayton, Ohio.

DAIMLERCHRYSLER

February 26, 2001

DaimlerChrysler Corporation

Ms. Jo Wilson
Facilities Manager
City of Dayton
101 west Third Street
Dayton, OH 45402

Re: Access for Hydrogeological Investigation

Dear Ms. Wilson:

DaimlerChrysler Corporation appreciates your cooperation in executing the Access Agreement dated December 12, 2000, which allows us to install a groundwater monitoring well on your property located Claridge Park in Dayton, Ohio. As we previously discussed, DaimlerChrysler is conducting a voluntary hydrogeological investigation regarding the possible presence of historic industrial solvents in shallow ground water in the vicinity of the Dayton Thermal Products plant.

We would like to begin installing the wells in Claridge Park on March 5, 2001. During the drilling of these wells you will be invited to a public meeting for an update and (weather permitting) to view the drilling operation.

Thank you for your consideration and cooperation in this matter. In the meantime, please feel free to contact me at 248-576-7354 or Gary Stanczuk of my staff at 248-576-7365 with any comments or questions you may have regarding the planned scope of work.

Sincerely,

Michael J. Curry
Remediation Program Manager

DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-51
Auburn Hills MI USA 48326-2757

rtment of Public Works
vision of Facilities Management
937) 333-4001
FAX 333-4002

City of Dayton, Ohio
City Hall
101 West Third Street
P O Box 22
Dayton, OH 45401

www daytongov com

December 13, 2000

Gary Stanczuk
DaimlerChrysler Corporation
CIMS 482-00-51
1000 Chrysler Drive
Auburn Hills, Michigan 48326

Dear Mr. Stanczuk:

Enclosed is a signed copy of your access agreement with the City of Dayton for a right of access to Claridge Park.

If you have any questions please call me at (937) 333-4016.

Sincerely,

Stephanie Bryant

Stephanie Bryant, Property Clerk
Facilities Management

/sb

Enclosure

ACCESS AGREEMENT

This Access Agreement ("Agreement") is made this 12th day of DECEMBER, 2000, by and between DaimlerChrysler Corporation, and The City of Dayton, Ohio ("City"), a municipal corporation under the laws of Ohio.

In consideration of the mutual promises and covenants contained in this Agreement, the receipt and sufficiency of which is acknowledged by both parties, the City of Dayton, Ohio, and DaimlerChrysler Corporation agree as follows:

1. The City grants to DaimlerChrysler Corporation, its employees, and agents (collectively, "DaimlerChrysler") a non-transferable, non-assignable right of access to Claridge Park as shown on Exhibit A ("Property"), to place seven groundwater monitoring wells. The right of access the City grants to DaimlerChrysler also includes access to inspect, maintain and repair the wells, and take periodic samples of groundwater from the wells.

2. The wells will be installed as mutually agreed by the City and DaimlerChrysler. DaimlerChrysler will cooperate with the City in reasonable efforts to camouflage the wells. After installing the wells, DaimlerChrysler will promptly restore the Property to the reasonable satisfaction of the City, and provide the City with a key or other means of accessing the well.

3. DaimlerChrysler will perform regular and periodic inspections of the wells, and maintenance to the wells as necessary.

4. DaimlerChrysler will conduct the activities described in paragraph 1 of this Agreement during reasonable business hours, and will provide 48-hour notice by telephone to the City prior to entering the Property to conduct these activities.

5. DaimlerChrysler will provide to the City of Dayton, Department of Water, Division of Environmental Management, 320 West Monument Avenue, Dayton, OH 45402, a copy of all analytical, water level and geological data from sampling conducted on its Property within 30 days from DaimlerChrysler's receipt of the data.

6. The City reserves the right to access, sample or obtain water level measurements from the wells installed on its Property by DaimlerChrysler. The City will provide DaimlerChrysler with a copy of the results of its sampling conducted on its Property within 60 days of said sampling or the City's receipt of such data, whichever is later. The City will conduct its sampling activities during reasonable business hours, and will provide 48-hour notice by telephone to DaimlerChrysler prior to conducting these activities. Daimler Chrysler and the City each agree to provide the other with split samples upon request.

7. DaimlerChrysler will be responsible for securing the wells at all times, except when the City unlocks the wells to conduct sampling, or when DaimlerChrysler unlocks the wells to conduct sampling, perform maintenance or repair the wells. The City agrees that it will not cause damage to the wells and will promptly lock the wells after sampling.

8. Daimler Chrysler agrees to defend, indemnify and hold harmless the City and its officers, agents and employees from any and all liability, damages and claims including, but not limited to, judgments, attorney fees, costs, fines, and expenses for property damage,

environmental impairment, and/or personal or bodily injury to any person, entity or governmental agency arising out of or attributed to any act or omission of Daimler Chrysler, its officers, agents and employees in the performance of this agreement, and/or occupancy or use of the Property.

9. Either party may terminate this Agreement upon thirty (30) days written notice to the other party; otherwise, this Agreement will continue in full force and effect for two years after installation of the wells, which installation will occur no later than March 2001. DaimlerChrysler may request in writing, at least 90 days prior to the expiration of the initial term or any renewal thereof, to have this Agreement extended for an additional two year period. Upon receipt of said written notice, the City may, at its sole discretion, agree in writing to extend this Agreement for an additional two year period.

10. Upon expiration or termination of this Agreement, DaimlerChrysler will, at the sole discretion of the City, transfer ownership of the wells to the City or promptly remove the wells at DaimlerChrysler's sole cost and expense and restore the Property to the reasonable satisfaction of the City. If the City elects not to take ownership of the wells, Daimler Chrysler agrees to close the wells in a manner that complies with all applicable laws.

11. Notices under this Agreement will be made to DaimlerChrysler at:

Gary Stanczuk
DaimlerChrysler Corporation
CIMS 482-00-51
1000 Chrysler Drive
Auburn Hills, MI 48326
248-576-7365;

and to the City of Dayton at:

Jo Wilson
Facilities Management
City of Dayton
101 West Third Street
Dayton, OH 45402
937-333-4003.

12. This Agreement is governed by the laws of the State of Ohio. If any provision of this Agreement is deemed invalid, such invalidity will have no effect on the other provisions, which will remain in full force and effect. This Agreement will be binding on and inure to the benefit of the parties' successors and assigns.

13. This Agreement may be executed in counterparts, which will together constitute the entire document. If DaimlerChrysler deems it necessary, DaimlerChrysler may record this Agreement at its expense.

THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the parties, through their duly authorized representatives, have entered into this Access Agreement as of the day and year first above written.

IN THE PRESENCE OF:

Stephanie S. Bryant

The City of Dayton

By Jo Wilson for

Its City Manager

STATE OF OHIO, MONTGOMERY COUNTY, SS:
Before me, a Notary Public in and for said County, personally came Jo Wilson, of the City of Dayton, Ohio, the municipal corporation which executed the foregoing Access Agreement, who acknowledged that he did sign said Access Agreement as such officer in behalf of said municipal corporation, and by the authority of the commission thereof, and that it is the free act and deed of the said City of Dayton, for the uses and purposes herein mentioned.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my notarial seal, this 12th day of December, 2000.

Stephanie S. Bryant nee Delder
Notary Public

IN THE PRESENCE OF:

DaimlerChrysler Corporation

By

Its Senior Manager

STATE OF OHIO, MONTGOMERY COUNTY, SS:
Before me, a Notary Public in and for the County, personally came Greg M. Rose, one of the parties in the foregoing Access Agreement, and acknowledged the signing thereof to be its and his voluntary act and deed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my notarial seal this 30 day of November, 2000.

Frances Reinhardt
Notary Public

Approved as to form, correctness, and legal sufficiency:

John J. Danisch
City Attorney

Approved by the Commission of the City of Dayton:

_____, 20__

Min. Bk._____ Pg._____

_____
Clerk of the Commission

EXHIBIT A

Legal Description for Parcel ID # R72-057-01-0103.

Situate in the City of Dayton, County of Montgomery and State of Ohio, and being a part of Lot No. fifteen thousand five hundred and seven (15507) of the revised and consecutive numbers of lots on the plat of said city, bounded and described as follows: Beginning at the southwest corner of said lot; thence northwest with the west line of said lot four hundred and seven and four (407.4) tenths feet; thence eastwardly parallel to the south line of said lot five hundred and twenty-one and seven (521.7) tenths feet; thence southwardly parallel to the west line of said lot four hundred and seven and four (407.4) tenths feet to a stone on the south line of said lot; thence westwardly with the south line of said lot five hundred and twenty-one and eight (521.8) tenths feet to the place of beginning, containing four and eight hundred and seventy-eight thousandths (4.878) acres.

DAIMLERCHRYSLER

February 26, 2001

DaimlerChrysler Corporation

Mr. Mark Kanter
President
Rookwood Properties
105 E. 4th Street
Cincinnati, OH 45202

Re: Access for Hydrogeological Investigation

Dear Mr. Kanter:

DaimlerChrysler Corporation appreciates your cooperation in executing the Access Agreement dated June 29,2000, which allows us to install two groundwater monitoring wells on your property located at 1200 Leo Street in Dayton, Ohio. As we previously discussed, DaimlerChrysler is conducting a voluntary hydrogeological investigation regarding the possible presence of historic industrial solvents in shallow ground water in the vicinity of the Dayton Thermal Products plant.

We would like to begin installing the wells on your property and in the community this March. We will contact you several days prior to the specific date we would like to mobilize to your site. The first wells will be installed in Claridge Park located at Webster and Leonard Streets. During the drilling of these wells you will be invited to a public meeting for an update and (weather permitting) to view the drilling operation.

Enclosed for your records are a copy of the executed Access Agreement, Legal Description of the property, and an aerial photo showing the approximate well locations.

Thank you for your consideration and cooperation in this matter. In the meantime, please feel free to contact me at 248-576-7354 or Gary Stanczuk of my staff at 248-576-7365 with any comments or questions you may have regarding the planned scope of work.

Sincerely,

Michael J. Curry
Remediation Program Manager

DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-51
Auburn Hills MI USA 48326-2757

ACCESS AGREEMENT

THIS ACCESS AGREEMENT ("Agreement") is made this 29th day of June, 2000, by and between DaimlerChrysler Corporation, whose address is 1000 Chrysler Drive, Auburn Hills, MI 48326 and WAREHOUSE INVESTORS, LLC ("Owner"), whose address is 105 E. 4th STREET, SUITE 1120, CINCINNATI, OHIO 45202 regarding the Owner's property located at 1200 LEO STREET, DAYTON, OHIO and a legal description of which is attached as Exhibit A ("Owner's Property").

In consideration of the mutual promises and covenants contained in this Agreement, the receipt and sufficiency of which is acknowledged by both parties, Owner and DaimlerChrysler Corporation agree as follows:

1. Owner grants to DaimlerChrysler Corporation, its employees, and agents (collectively, "DaimlerChrysler") access to Owner's Property to place monitoring wells.* The right of access that Owner grants to DaimlerChrysler also includes access to maintain and repair the well, as well as to take periodic samples of groundwater from the well. * in the approximate location indicated on attached Exhibit B, subject to the prior approval of Owner's tenant.

2. After installing the well, DaimlerChrysler will promptly restore Owner's Property to its original condition to the extent possible, excluding well itself. DaimlerChrysler will cooperate with Owner in reasonable efforts to camouflage the well.

3. DaimlerChrysler will conduct the activities described in paragraph 1 of this Agreement during reasonable business hours, and will attempt to give Owner 48 hours notice by telephone before entering Owner's Property to conduct these activities. DaimlerChrysler will promptly provide Owner with a copy of the results of sampling conducted on its property if Owner requests those results in writing.

4. Owner agrees that the well will be locked at all times, except when DaimlerChrysler unlocks the well to conduct sampling, or to maintain or repair the well. Owner agrees that it will not interfere, tamper with or cause damage to the well.

5. DaimlerChrysler will defend and indemnify Owner from and against any and all claims made by any third party related to the installation, maintenance, repair and existence of the well on Owner's Property.

6. This Agreement will continue until DaimlerChrysler terminates it. If DaimlerChrysler has not sampled, repaired or conducted maintenance on the well for a period of two years after its installation, then Owner may request, in writing,

that the well be removed and this Agreement terminated. DaimlerChrysler will then have 60 days to respond in writing to either continue or terminate the Agreement. Upon termination of this Agreement, DaimlerChrysler shall promptly remove the well and restore Owner's Property to its original condition to the extent possible.

7. Any notices required under this Agreement shall be sent to :

If to DaimlerChrysler: Gary Stanczuk
DaimlerChryslerCorporation
CIMS 482-00-51
1000 Chrysler Drive
Auburn Hills, MI 48326

If to Owner: MARK KANTER
WAREHOUSE INVESTORS
105 E 4TH ST., SUITE 1120
CINCINNATI, OHIO 45202

8. This Agreement is governed by the laws of the State of Ohio. If any provision of this Agreement is deemed invalid, such invalidity shall have no effect on the other provisions, which shall remain in full force and effect. This Agreement shall be binding on and inure to the benefit of the parties' successors and assigns.

9. This Agreement may be executed in counterparts, which shall together constitute the entire document. If DaimlerChrysler deems it necessary, DaimlerChrysler may record this Agreement.

IN WITNESS WHEREOF, the parties have set their hands on this 29 day of June, 2000.

WITNESSES

Natalie C Smith
By: Natalie C Smith

Marilyn B. Siler
By: Marilyn B. Siler

OWNER

WAREHOUSE INVESTORS LLC
By: Mark Kanter
Its: Member

STATE OF Ohio)
) SS
COUNTY OF Hamilton)

BE IT REMEMBERED that on this 29th day of June, 2000, before me, a Notary Public, personally came Mark Kanter, and acknowledged that he/she did sign the foregoing instrument as his voluntary act and deed for the uses and purposes therein mentioned.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my official seal on the day and year last aforesaid.

Natalie C Smith
, Notary Public
Hamilton County, OH
My Commission expires: 7-23-03

NOTARIAL SEAL STATE OF OHIO

NATALIE C. SMITH
Notary Public, State of Ohio
My Commission Expires July 23, 2003

WITNESSES

By: Michael J. Curry

By: Gary M. Stadczyk

DAIMLERCHRYSLER CORPORATION

By:

Its: Gregory M Rose

STATE OF MICHIGAN)
) **SS**
COUNTY OF OAKLAND)

On this 29th day of November, 2011, before me, the undersigned, a Notary Public in and for said County and State personally appeared Gregory M. Rose to me personally known, who being sworn did say that he is Senior Manager of the Corporation in the foregoing instrument, and that the seal thereto affixed is the Corporate Seal of said Corporation and that said instrument was signed and sealed on behalf of said Corporation by authority of its Board of Directors and said Gregory M Rose acknowledged said instrument to be the free act and deed of said Corporation.

WITNESS my hand and Notarial Seal subscribed and affixed in said County and State, the day and year in this certificate above written.

Frances Reinhardt
FRANCES REINHARDT, Notary Public
MACOMB County, MICHIGAN
My Commission expires: 8-30-2018
Acting in and for Oakland County

This instrument was prepared by and should be returned to:
Kathleen M. Hennessey
DaimlerChrysler Corporation
1000 Chrysler Drive
Auburn Hills, MI 48326
(248) 512-4116

EXHIBIT "A"

Situate in the City of Dayton, County of Montgomery, State of Ohio and being a part of Lot numbered Fifteen Thousand Five Hundred Seven (15507) of the consecutive numbers of lots on the revised plat of the said City of Dayton, Ohio and designated Lot number Four (4) on a plat recorded in Plat Book A, Pages 179 and 180, situate in Section 5, Town 1, Range 7 M.R.S. and described as follows:

Beginning at a stone at the intersection of the centerline of Kiser Street and the south line of said Lot 15507; thence north with the centerline of Kiser Street, 813.2 feet to the center of Leo Street; thence east with the centerline of Leo Street, 264.5 feet to the west line of the C.H. & D. Railroad right of way; thence south with the west line of said right of way 813.2 feet to the south line of said Lot 15507, thence west with the south line of said lot, 270.7 feet to the place of beginning, containing 4.996 acre more or less.

EXCEPTING THEREFROM THE FOLLOWING DESCRIBED REAL ESTATE:

Situate in the City of Dayton, County of Montgomery, State of Ohio and being a part of Lot 15507 of the revised and consecutive number of the City of Dayton, Ohio Situate in Section 5, Town 1, Range 7 M.R.S., and described as follows:

Beginning at a point on the centerline of Leo Street and 258.5 feet east of the centerline of Kiser Street, running thence east along the centerline of Leo Street 6 feet to the west line of the Cincinnati Hamilton and Dayton Railway's right of way; thence south with the west line of said right of way 813.2 feet to the south line of the said Lot 15507; thence west along the said south line 10.8 feet to a stake; thence northwardly in a straight line 813.2 feet more of less to the place of beginning, containing 0.155 acre more or less. Being a strip 813.2 feet along 6 feet wide to the north end, 10.8 feet wide at the south end taken off the east side of property conveyed by Katherine Sherwood to Kay and Ess Co. by deed recorded in Book 278, Page 191, Montgomery County deed records.

BEING THE SAME PROPERTY DESCRIBED AS FOLLOWS:

Situate in Section 5, Town 1, Range 7 M.R.S. in the City of Dayton, Montgomery County, Ohio, being part of Lot 15507 of the revised and consecutive numbers of lots of the City of Dayton, Ohio and being part of Lot 4 of D. Kiser's Plat, recorded in Plat Book A, Pages 179 and 180 of the Plat Records of Montgomery County, Ohio, being the same premises as conveyed to Warehouse Investors by deed recorded in microfiche Number 85-508C11 of the Deed Records of said county, and being a tract of land more particularly described as follows:

Beginning at an iron pin set at the intersection of the east right-of-way line of Kiser Street (Fifty-Five Feet wide) and the south right-of-way line of Leo Street (Fifty Feet wide); thence from said point of beginning South 88° 08' 10" East with the south right-of-way

line of Leo Street a distance of 231.02 feet to an iron pin set at the west line of part Lot 15507 conveyed to the B. & O. Railroad (Conrail) by deed recorded in Deed Book 261, Page 501; thence South 01° 21' 10" West with the west line of said railroad tract a distance of 766.07 feet to an iron pin set on the north right-of-way line of Leonhard Street (Fifty Feet wide); thence North 88° 08' 10" West with the north right-of-way line of Leonhard Street a distance of 231.88 feet to an iron pin set at the intersection of said north line and the east right-of-way line of Kiser Street; thence North 01° 25' 00" East with the east right-of-way line of Kiser Street a distance of 766.06 feet to the point of beginning, containing 4.070 acres of land.

This description prepared by McDougall Associates, Inc. based on a survey made by same in November, 1998. All iron pins set are 30" x 5/8" capped "McDougall Assoc". Bearings are based on the west right-of-way line of the railroad as shown on Plat Book A, Pages 179-180

jab COLUMBUS/0495271 02

EXHIBIT "A"

Situate in the City of Dayton, County of Montgomery, State of Ohio and being a part of Lot numbered FIFTEEN THOUSAND FIVE HUNDRED SEVEN (15507) of the consecutive numbers of lots on the revised plat of the said City of Dayton, Ohio and designated Lot numbered FOUR (4) on a plat recorded in Plat Book A, Pages 179 and 180, situate in Section 5, Town 1, Range 7 M.R.S and described as follows:

Beginning at a stone at the intersection of the centerline of Kiser Street and the south line of said Lot 15507; thence north with the centerline of Kiser Street, 813.2 feet to the center of Leo Street; thence east with the centerline of Leo Street, 264.5 feet to the west line of the C.H. & D. Railroad right of way; thence south with the west line of said right of way 813.2 feet to the south line of said Lot 15507; thence west with the south line of said lot, 270.7 feet to the place of beginning, containing 4.996 acre more or less.

EXCEPTING THEREFROM THE FOLLOWING DESCRIBED REAL ESTATE:

Situate in the City of Dayton, County of Montgomery, State of Ohio and being a part of Lot 15507 of the revised and consecutive numbers of the City of Dayton Ohio. Situate in Section 5, Town 1, Range 7 M.R.S., and described as follows: Beginning at a point on the centerline of Leo Street and 258.5 feet east of the centerline of Kiser Street running thence east along the centerline of Leo Street 6 feet to the west line of the Cincinnati Hamilton and Dayton Railway's right of way; thence south with the west line of said right of way 813.2 feet to the south line of the said Lot 15507; thence west along the said south line 10.8 feet to a stake; thence northwardly in a straight line 813.2 feet more or less to the place of beginning, containing 0.155 acre more or less. Being a strip 813.2 feet along 6 feet wide to the north end 10.8 feet wide at the south end taken off the east side of property conveyed by Katherine Sherwood to Kay and Ess Co. by deed recorded in Book 278, Page 191, Montgomery County deed records.

ROOKWOOD PROPERTIES

105 East Fourth Street / Suite 1120 / Cincinnati, OH 45202 / (513) 421-6611 / Fax (513) 562-8784

July 6, 2000

Mr. Gary Stanczuk
Daimler Chrysler Corporation
800 Chrysler Drive 482-00-51
Auburn Hills, MI 48326-2757

Re: 1200 Leo Street, Dayton, Ohio

Dear Gary:

Enclosed please find two (2) original signed copies of the Access Agreement. Please send me a fully executed copy for my files. Thank you.

Very truly yours,

Mark S. Kanter
President

MSK/cbs
Doc\mark\stanczuk

Enclosure

DAIMLERCHRYSLER

February 26, 2001

DaimlerChrysler Corporation

Mr. Tom Daskalakis
1440 Milburn Ave.
Dayton, OH 45404

Re: Access for Hydrogeological Investigation

Dear Mr. Daskalakis:

DaimlerChrysler Corporation appreciates your cooperation in executing the Access Agreement dated August 8, 2000, which allows us to install a groundwater monitoring well on your property located at 1440 Milburn Street in Dayton, Ohio. As we previously discussed, DaimlerChrysler is conducting a voluntary hydrogeological investigation regarding the possible presence of historic industrial solvents in shallow ground water in the vicinity of the Dayton Thermal Products plant.

We would like to begin installing the wells on your property and in the community this March. We will contact you several days prior to the specific date we would like to mobilize to your site. The first wells will be installed in Claridge Park located at Webster and Leonard Streets. During the drilling of these wells you will be invited to a public meeting for an update and (weather permitting) to view the drilling operation.

Enclosed for your records are a copy of the executed Access Agreement, Legal Description of the property, and an aerial photo showing the approximate well location.

Thank you for your consideration and cooperation in this matter. In the meantime, please feel free to contact me at 248-576-7354 or Gary Stanczuk of my staff at 248-576-7365 with any comments or questions you may have regarding the planned scope of work.

Sincerely,

Michael J. Curry
Remediation Program Manager

DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-51
Auburn Hills MI USA 48326-2757

Please note that we returned the two Access Agreements. I apologize for the inconvenience. However, we need the original notarized and returned. If it is helpful I could arrange for you to meet with a notary at the Plant. I can be reached at 248-576-7365.

Thanks again for your help.

Gary Stanczuk

ACCESS AGREEMENT

THIS ACCESS AGREEMENT ("Agreement") is made this 8th day of August, 2000, by and between DaimlerChrysler Corporation, whose address is 1000 Chrysler Drive, Auburn Hills, MI 48326 and Troy Street Prop. ("Owner"), whose address is 1440 Arcburn Ave Dayton, Ohio 45406, and a legal description of which is attached as Exhibit A ("Owner's Property").

In consideration of the mutual promises and covenants contained in this Agreement, the receipt and sufficiency of which is acknowledged by both parties, Owner and DaimlerChrysler Corporation agree as follows:

1. Owner grants to DaimlerChrysler Corporation, its employees, and agents (collectively, "DaimlerChrysler") access to Owner's Property to place monitoring wells. The right of access that Owner grants to DaimlerChrysler also includes access to maintain and repair the well, as well as to take periodic samples of groundwater from the well.

2. After installing the well, DaimlerChrysler will promptly restore Owner's Property to its original condition to the extent possible, excluding well itself. DaimlerChrysler will cooperate with Owner in reasonable efforts to camouflage the well.

3. DaimlerChrysler will conduct the activities described in paragraph 1 of this Agreement during reasonable business hours, and will attempt to give Owner 48 hours notice by telephone before entering Owner's Property to conduct these activities. DaimlerChrysler will promptly provide Owner with a copy of the results of sampling conducted on its property if Owner requests those results in writing.

4. Owner agrees that the well will be locked at all times, except when DaimlerChrysler unlocks the well to conduct sampling, or to maintain or repair the well. Owner agrees that it will not interfere, tamper with or cause damage to the well.

5. DaimlerChrysler will defend and indemnify Owner from and against any and all claims made by any third party related to the installation, maintenance, repair and existence of the well on Owner's Property.

6. This Agreement will continue until DaimlerChrysler terminates it. If DaimlerChrysler has not sampled, repaired or conducted maintenance on the well for a period of two years after its installation, then Owner may request, in writing,

that the well be removed and this Agreement terminated. DaimlerChrysler will then have 60 days to respond in writing to either continue or terminate the Agreement. Upon termination of this Agreement, DaimlerChrysler shall promptly remove the well and restore Owner's Property to its original condition to the extent possible.

7. Any notices required under this Agreement shall be sent to :

If to DaimlerChrysler: Gary Stanczuk
DaimlerChryslerCorporation
CIMS 482-00-51
1000 Chrysler Drive
Auburn Hills, MI 48326

If to Owner: _____
_____
_____
_____

8. This Agreement is governed by the laws of the State of Ohio. If any provision of this Agreement is deemed invalid, such invalidity shall have no effect on the other provisions, which shall remain in full force and effect. This Agreement shall be binding on and inure to the benefit of the parties' successors and assigns.

9. This Agreement may be executed in counterparts, which shall together constitute the entire document. If DaimlerChrysler deems it necessary, DaimlerChrysler may record this Agreement.

IN WITNESS WHEREOF, the parties have set their hands on this _____ day of _____, 2000.

WITNESSES

By: Jan L. Dalton

By: Janet Short

OWNER

TROY STREET PROPERTIES

By: _____

Its: Pres.

STATE OF)
) **SS**
COUNTY OF)

BE IT REMEMBERED that on this ____ day of _____, 20____, before me, a Notary Public, personally came _____, and acknowledged that he/she did sign the foregoing instrument as his voluntary act and deed for the uses and purposes therein mentioned.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my official seal on the day and year last aforesaid.

_____

_____, Notary Public

_____ County, _____

My Commission expires._____

WITNESSES

By: Michael J. Curry

By: Gary M. Stanczyk

DAIMLERCHRYSLER CORPORATION

By:

Its: Gregory M. Rose

STATE OF MICHIGAN)
) **SS**
COUNTY OF OAKLAND)

On this 29th day of November, ~~19~~ 2000, before me, the undersigned, a Notary Public in and for said County and State personally appeared Gregory M. Rose to me personally known, who being sworn did say that he is Senior Manager of the Corporation in the foregoing instrument, and that the seal thereto affixed is the Corporate Seal of said Corporation and that said instrument was signed and sealed on behalf of said Corporation by authority of its Board of Directors and said Gregory M Rose acknowledged said instrument to be the free act and deed of said Corporation.

WITNESS my hand and Notarial Seal subscribed and affixed in said County and State, the day and year in this certificate above written.

Frances Reinhardt

FRANCES REINHARDT, Notary Public

MACOMB County, MICHIGAN

My Commission expires: 8-30-2005

Acting in and for Oakland County

This instrument was prepared by and should be returned to:
Kathleen M. Hennessey
DaimlerChrysler Corporation
1000 Chrysler Drive
Auburn Hills, MI 48326
(248) 512-4116

ACCESS AGREEMENT

THIS ACCESS AGREEMENT ("Agreement") is made this 8th day of August, 2000, by and between DaimlerChrysler Corporation, whose address is 1000 Chrysler Drive, Auburn Hills, MI 48326 and Troy Street Prop. ("Owner"), whose address is 1440 Gilbert Ave Dayton, Ohio 45404, and a legal description of which is attached as Exhibit A ("Owner's Property").

In consideration of the mutual promises and covenants contained in this Agreement, the receipt and sufficiency of which is acknowledged by both parties, Owner and DaimlerChrysler Corporation agree as follows:

1. Owner grants to DaimlerChrysler Corporation, its employees, and agents (collectively, "DaimlerChrysler") access to Owner's Property to place monitoring wells. The right of access that Owner grants to DaimlerChrysler also includes access to maintain and repair the well, as well as to take periodic samples of groundwater from the well.

2. After installing the well, DaimlerChrysler will promptly restore Owner's Property to its original condition to the extent possible, excluding well itself. DaimlerChrysler will cooperate with Owner in reasonable efforts to camouflage the well.

3. DaimlerChrysler will conduct the activities described in paragraph 1 of this Agreement during reasonable business hours, and will attempt to give Owner 48 hours notice by telephone before entering Owner's Property to conduct these activities. DaimlerChrysler will promptly provide Owner with a copy of the results of sampling conducted on its property if Owner requests those results in writing.

4. Owner agrees that the well will be locked at all times, except when DaimlerChrysler unlocks the well to conduct sampling, or to maintain or repair the well. Owner agrees that it will not interfere, tamper with or cause damage to the well.

5. DaimlerChrysler will defend and indemnify Owner from and against any and all claims made by any third party related to the installation, maintenance, repair and existence of the well on Owner's Property.

6. This Agreement will continue until DaimlerChrysler terminates it. If DaimlerChrysler has not sampled, repaired or conducted maintenance on the well for a period of two years after its installation, then Owner may request, in writing,

that the well be removed and this Agreement terminated. DaimlerChrysler will then have 60 days to respond in writing to either continue or terminate the Agreement. Upon termination of this Agreement, DaimlerChrysler shall promptly remove the well and restore Owner's Property to its original condition to the extent possible.

7. Any notices required under this Agreement shall be sent to :

If to DaimlerChrysler: Gary Stanczuk
DaimlerChryslerCorporation
CIMS 482-00-51
1000 Chrysler Drive
Auburn Hills, MI 48326

If to Owner: _____
_____
_____
_____

8. This Agreement is governed by the laws of the State of Ohio. If any provision of this Agreement is deemed invalid, such invalidity shall have no effect on the other provisions, which shall remain in full force and effect. This Agreement shall be binding on and inure to the benefit of the parties' successors and assigns.

9. This Agreement may be executed in counterparts, which shall together constitute the entire document. If DaimlerChrysler deems it necessary, DaimlerChrysler may record this Agreement.

IN WITNESS WHEREOF, the parties have set their hands on this _____ day of _____, 2000.

WITNESSES

By: Jan L. Dalton

By: Janet Short

OWNER

Troy Street Properties

By: [signature]

Its: Pres.

STATE OF)
) **SS**
COUNTY OF)

BE IT REMEMBERED that on this 28 day of February, 2001, before me, a Notary Public, personally came T. Daskalakis, and acknowledged that he/she did sign the foregoing instrument as his voluntary act and deed for the uses and purposes therein mentioned.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my official seal on the day and year last aforesaid.

Cheryl L. Wills Formally Cheryl L. Smith, Notary Public

_____ County, Montgomery

My Commission expires: Aug. 14, 2002

CHERYL L. SMITH NOTARY PUBLIC
IN AND FOR THE STATE OF OHIO
MY COMMISSION EXPIRES AUG. 14, 2002

WITNESSES

By: Michael J. Curry

By: Gary M. Stanczyk

DAIMLERCHRYSLER CORPORATION

By:

Its: Gregory M. Rose

STATE OF MICHIGAN)
) **SS**
COUNTY OF OAKLAND)

On this 29th day of November, ~~19~~ 2000, before me, the undersigned, a Notary Public in and for said County and State personally appeared Gregory M. Rose to me personally known, who being sworn did say that he is Senior Manager of the Corporation in the foregoing instrument, and that the seal thereto affixed is the Corporate Seal of said Corporation and that said instrument was signed and sealed on behalf of said Corporation by authority of its Board of Directors and said Gregory M Rose acknowledged said instrument to be the free act and deed of said Corporation.

WITNESS my hand and Notarial Seal subscribed and affixed in said County and State, the day and year in this certificate above written.

Frances Reinhardt

FRANCES REINHARDT, Notary Public

MACOMB County, MICHIGAN

My Commission expires: 8-30-2005

Acting in and for Oakland County

This instrument was prepared by and should be returned to:
Kathleen M. Hennessey
DaimlerChrysler Corporation
1000 Chrysler Drive
Auburn Hills, MI 48326
(248) 512-4116

ACCESS AGREEMENT

This Access Agreement ("Agreement") is made this 27th day of February, 2001, by and between DaimlerChrysler Corporation, and The City of Dayton, Ohio ("City"), a municipal corporation under the laws of Ohio.

In consideration of the mutual promises and covenants contained in this Agreement, the receipt and sufficiency of which is acknowledged by both parties, the City of Dayton, Ohio, and DaimlerChrysler Corporation agree as follows:

1. The City grants to DaimlerChrysler Corporation, its employees, and agents (collectively, "DaimlerChrysler") a non-transferable, non-assignable right of access to Property as described in Exhibit A ("Property"), to place one groundwater monitoring well. The right of access the City grants to DaimlerChrysler also includes access to inspect, maintain and repair the well, and take periodic samples of groundwater from the well.

2. The well will be installed as mutually agreed by the City and DaimlerChrysler. DaimlerChrysler will cooperate with the City in reasonable efforts to camouflage the well. After installing the well, DaimlerChrysler will promptly restore the Property to the reasonable satisfaction of the City, and provide the City with a key or other means of accessing the well.

3. DaimlerChrysler will perform regular and periodic inspections of the well, and maintenance to the well as necessary.

4. DaimlerChrysler will conduct the activities described in paragraph 1 of this Agreement during reasonable business hours, and will provide 48-hour notice by telephone to the City prior to entering the Property to conduct these activities.

5. DaimlerChrysler will provide to the City of Dayton, Department of Water, Division of Environmental Management, 320 West Monument Avenue, Dayton, OH 45402, a copy of all analytical, water level and geological data from sampling conducted on its Property within 30 days from DaimlerChrysler's receipt of the data.

6. The City reserves the right to access, sample or obtain water level measurements from the well installed on its Property by DaimlerChrysler. The City will provide DaimlerChrysler with a copy of the results of its sampling conducted on its Property within 60 days of said sampling or the City's receipt of such data, whichever is later. The City will conduct its sampling activities during reasonable business hours, and will provide 48-hour notice by telephone to DaimlerChrysler prior to conducting these activities. Daimler Chrysler and the City each agree to provide the other with split samples upon request.

7. DaimlerChrysler will be responsible for securing the well at all times, except when the City unlocks the well to conduct sampling, or when DaimlerChrysler unlocks the well to conduct sampling, perform maintenance or repair the well. The City agrees that it will not cause damage to the well and will promptly lock the well after sampling.

8. Daimler Chrysler agrees to defend, indemnify and hold harmless the City and its officers, agents and employees from any and all liability, damages and claims including, but not limited to, judgments, attorney fees, costs, fines, and expenses for property damage, environmental impairment, and/or personal or bodily injury to any person, entity or governmental agency arising out of or attributed to any act or omission of Daimler

Chrysler, its officers, agents and employees in the performance of this agreement, and/or occupancy or use of the Property.

9. Either party may terminate this Agreement upon thirty (30) days written notice to the other party; otherwise, this Agreement will continue in full force and effect for two years after installation of the well, which installation will occur no later than May 2001. DaimlerChrysler may request in writing, at least 90 days prior to the expiration of the initial term or any renewal thereof, to have this Agreement extended for an additional two year period. Upon receipt of said written notice, the City may, at its sole discretion, agree in writing to extend this Agreement for an additional two year period.

10. Upon expiration or termination of this Agreement, DaimlerChrysler will, at the sole discretion of the City, transfer ownership of the well to the City or promptly remove the well at DaimlerChrysler's sole cost and expense and restore the Property to the reasonable satisfaction of the City. If the City elects not to take ownership of the well, Daimler Chrysler agrees to close the well in a manner that complies with all applicable laws.

11. Notices under this Agreement will be made to DaimlerChrysler at:

Gary Stanczuk
DaimlerChrysler Corporation
CIMS 482-00-51
1000 Chrysler Drive
Auburn Hills, MI 48326
248-576-7365;

and to the City of Dayton at:

Jo Wilson
Facilities Management
City of Dayton
101 West Third Street
Dayton, OH 45402
937-333-4003.

12. This Agreement is governed by the laws of the State of Ohio. If any provision of this Agreement is deemed invalid, such invalidity will have no effect on the other provisions, which will remain in full force and effect. This Agreement will be binding on and inure to the benefit of the parties' successors and assigns.

13. This Agreement may be executed in counterparts, which will together constitute the entire document. If DaimlerChrysler deems it necessary, DaimlerChrysler may record this Agreement at its expense.

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IN WITNESS WHEREOF, the parties, through their duly authorized representatives, have entered into this Access Agreement as of the day and year first above written.

IN THE PRESENCE OF:

Betty Green

Stephanie Bryant

The City of Dayton

By Jo Wilson for City Manager

Its Facilities Manager

STATE OF OHIO, MONTGOMERY COUNTY, SS:

Before me, a Notary Public in and for said County, personally came Jo Wilson, of the City of Dayton, Ohio, the municipal corporation which executed the foregoing Access Agreement, who acknowledged that she did sign said Access Agreement as such officer in behalf of said municipal corporation, and by the authority of the commission thereof, and that it is the free act and deed of the said City of Dayton, for the uses and purposes herein mentioned.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my notarial seal, this 28th day of June, 2001.

STEPHANIE S GELDER, Notary Public
In and for the State of Ohio
My Commission Expires July 8, 2001

Stephanie S. Bryant nee Delder
Notary Public

IN THE PRESENCE OF:

Daimler Chrysler Corporation

By

Its Gregory M. Rose

STATE OF MICHIGAN, OAKLAND COUNTY, SS:

Before me, a Notary Public in and for the County, personally came Gregory M. Rose one of the parties in the foregoing Access Agreement, and acknowledged the signing thereof to be its and his voluntary act and deed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my notarial seal this 27th day of February, 2001.

Frances Reinhardt
Frances Reinhardt, Notary Public
Macomb County, Michigan
Acting in and for Oakland County
My Commission expires: 8-30-2003

s to form, correctness,
ufficiency:

City Attorney

Approved by the Commission
of the City of Dayton:

_____, 2001

Min. Bk._____ Pg._____

_____
Clerk of the Commission

SAMPLE	DATE	CAS#	COMPOUND	RESULT	UNITS			DETECTION LIMIT	METHOD		
DP097/1-2'	20000712	127-18-4	Tetrachloroethene	110 0	UG/KG	SOIL	REG	26 0000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP097/1-2'	20000712	71-55-6	1,1,1-Trichloroethane	7 5	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP097/1-2'	20000712	541-05-9	Cyclotrisiloxane, hexamethyl-	10 0	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP097/1-2'	20000712	79-01-6	Trichloroethene	18 0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
			TOTAL VOC'S	145 5							
DP098/3-4'	20000712	127-18-4	Tetrachloroethene	7 8	UG/KG	SOIL	REG	6 0000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP098/3-4'	20000712		unknown1	6 8	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP098/3-4'	20000712		unknown2	6 2	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP098/3-4'	20000712		unknown3	6 6	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 50 INTERIOR GEOPROBING
			TOTAL VOC'S	27 4							
DP098/7-8'	20000712	127-18-4	Tetrachloroethene	13 0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
			TOTAL VOC'S	13.0							
DP099/3-4'	20000712	156-59-2	cis-1,2-Dichloroethene	7 7	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP099/3-4'	20000712	127-18-4	Tetrachloroethene	58 0	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP099/3-4'	20000712	79-01-6	Trichloroethene	15 0	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
			TOTAL VOC'S	80 7							
DP099/7-8'	20000712	156-59-2	cis-1,2-Dichloroethene	12 0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP099/7-8'	20000712	127-18-4	Tetrachloroethene	65 0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP099/7-8'	20000712	79-01-6	Trichloroethene	17 0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
			TOTAL VOC'S	94 0							
DP100/2-3'	20000712		No Searchable Peaks	0.0	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP100/6-7'	20000712		No Searchable Peaks	0 0	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 50 INTERIOR GEOPROBING
			TOTAL VOC'S	94 0							
DP102/2-3'	20000712	156-59-2	cis-1,2-Dichloroethene	9 5	UG/KG	SOIL	REG	5 5000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP102/2-3'	20000712	127-18-4	Tetrachloroethene	26 0	UG/KG	SOIL	REG	5 5000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP102/2-3'	20000712	79-01-6	Trichloroethene	9 9	UG/KG	SOIL	REG	5 5000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
			TOTAL VOC'S	45 4							
DP102/6-7'	20000712	156-59-2	cis-1,2-Dichloroethene	10 0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP102/6-7'	20000712	127-18-4	Tetrachloroethene	26 0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP102/6-7'	20000712	79-01-6	Trichloroethene	10 0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
			TOTAL VOC'S	46 0							
DP103/3-4'	20000712	127-18-4	Tetrachloroethene	140 0	UG/KG	SOIL	REG	5 7000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP103/3-4'	20000712		Unknown	9 2	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 50 INTERIOR GEOPROBING
			TOTAL VOC'S	149 2							
DP103/7-8'	20000712	127-18-4	Tetrachloroethene	420 0	UG/KG	SOIL	REG	540 0000	8260B\5035	VOC	BUIDLING 50 INTERIOR GEOPROBING
DP103/7-8'	20000712	541-05-9	Cyclotrisiloxane, hexamethyl-	6 2	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 50 INTERIOR GEOPROBING
			TOTAL VOC'S	426.2							

SAMPLE	DATE	CAS#	COMPOUND	RESULT	UNITS			DETECTION LIMIT	METHOD		
DP-89/1-2'	20000711		unknown1	5 7	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 59 INTERIOR GEOPROBING
			TOTAL VOC'S	5 7							
DP-89/6-7'	20000711		Unknown	5 9	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-89/6-7'	20000711	541-05-9	Cyclotrisiloxane, hexamethyl-	6 2	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-89/6-7'	20000711	75-09-2	Methylene chloride	8 3	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
			TOTAL VOC'S	20 4							
DP-91/2-3'	20000711	127-18-4	Tetrachloroethene	6 3	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-91/2-3'	20000711	79-01-6	Trichloroethene	10 0	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
			TOTAL VOC'S	16 3							
DP-91/5-6'	20000711	71-55-6	1,1,1-Trichloroethane	7 9	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-91/5-6'	20000711	79-01-6	Trichloroethene	20 0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-91/5-6'	20000711	127-18-4	Tetrachloroethene	25.0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
			TOTAL VOC'S	52 9							
DP-92/3-4'	20000712	127-18-4	Tetrachloroethene	12 0	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-92/3-4'	20000712	79-01-6	Trichloroethene	13 0	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
			TOTAL VOC'S	25 0							
DP-92/5-6'	20000712	71-55-6	1,1,1-Trichloroethane	19 0	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-92/5-6'	20000712	79-01-6	Trichloroethene	19 0	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-92/5-6'	20000712	127-18-4	Tetrachloroethene	37 0	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
			TOTAL VOC'S	75 0							
DP-93/2-3'	20000712	541-05-9	Cyclotrisiloxane, hexamethyl-	6 8	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-93/2-3'	20000712	79-01-6	Trichloroethene	36 0	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
			TOTAL VOC'S	42 8							
DP-93/6-7'	20000712	127-18-4	Tetrachloroethene	15 0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-93/6-7'	20000712	71-55-6	1,1,1-Trichloroethane	36 0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-93/6-7'	20000712	79-01-6	Trichloroethene	200 0	UG/KG	SOIL	REG	5.2000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
			TOTAL VOC'S	251 0							
DP-94/4-5'	20000712		unknown1	5 6	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-94/4-5'	20000712	79-01-6	Trichloroethene	79 0	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
			TOTAL VOC'S	84 6							
DP-95/3-4'	20000712	79-01-6	Trichloroethene	15 0	UG/KG	SOIL	REG	5 4000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
			TOTAL VOC'S	15 0							
DP-95/7-8'	20000712	79-01-6	Trichloroethene	15 0	UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
			TOTAL VOC'S	15 0							
DP-96/3-4'	20000712	541-05-9	Cyclotrisiloxane, hexamethyl-	9 0	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-96/3-4'	20000712	71-55-6	1,1,1-Trichloroethane	15 0	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
DP-96/3-4'	20000712	79-01-6	Trichloroethene	64 0	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 59 INTERIOR GEOPROBING
			TOTAL VOC'S	88.0							

SAMPLE	DATE	CAS#	COMPOUND	RESULT	UNITS			DETECTION LIMIT	METHOD		
DP075-6-8'	20000202	127-18-4	Tetrachloroethene	8 1	UG/KG	SOIL	REG	5 3000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	8 1							
DP075-14-16'	20000202	127-18-4	Tetrachloroethene	22 0	UG/KG	SOIL	REG	5 3000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	22 0							
DP075-18-20'	20000202	127-18-4	Tetrachloroethene	190 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
DP075-18-20'	20000202	79-01-6	Trichloroethene	8 1	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	198 1							
DP076-2-4'	20000202	127-18-4	Tetrachloroethene	7 8	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	7 8							
DP076-6-8'	20000202	127-18-4	Tetrachloroethene	71 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	71 0							
DP077-10-12'	20000202	127-18-4	Tetrachloroethene	76 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	76.0							
DP077-14-16'	20000202	127-18-4	Tetrachloroethene	200 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	200.0							
DP078-6-8'	20000202	127-18-4	Tetrachloroethene	13 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	13.0							
DP078-16-18'	20000202	127-18-4	Tetrachloroethene	48 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	48.0							
DP079-2-4'	20000203	127-18-4	Tetrachloroethene	6 5	UG/KG	SOIL	REG	5 9000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	6 5							
DP079-14-16'	20000203	127-18-4	Tetrachloroethene	56 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	56.0							
DP079-18-20'	20000203	127-18-4	Tetrachloroethene	20 0	UG/KG	SOIL	REG	5 3000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	20.0							
DP081-2-4'	20000203	127-18-4	Tetrachloroethene	11 0	UG/KG	SOIL	REG	6 1000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	11.0							
DP081-8-12'	20000203	127-18-4	Tetrachloroethene	49 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	49 0							
DP082-6-8'	20000203	127-18-4	Tetrachloroethene	50 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	50.0							
DP084-6-8'	20000203	127-18-4	Tetrachloroethene	17 0	UG/KG	SOIL	REG	5 3000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	17.0							

SAMPLE	DATE	CAS#	COMPOUND	RESULT	UNITS			DETECTION LIMIT	METHOD		
DP085-2-4'	20000203	127-18-4	Tetrachloroethene	18 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	**18 0**							
DP085-10-12'	20000203	127-18-4	Tetrachloroethene	160 0	UG/KG	SOIL	REG	26.0000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
DP085-10-12'	20000203	79-01-6	Trichloroethene	16 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	**176 0**							
DP087-2-4'	20000203	127-18-4	Tetrachloroethene	16 0	UG/KG	SOIL	REG	6 4000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	**16 0**							
DP087-5-8'	20000203	127-18-4	Tetrachloroethene	57 0	UG/KG	SOIL	REG	5 4000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	**57 0**							
DP087-5-8'/DUP	20000203	127-18-4	Tetrachloroethene	17 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	**17.0**							
DP087-14-16'	20000203	127-18-4	Tetrachloroethene	55 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	**55.0**							
DP087-18-20'	20000203	127-18-4	Tetrachloroethene	150 0	UG/KG	SOIL	REG	5 2000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	**150 0**							
DP088-6-8'	20000203	127-18-4	Tetrachloroethene	14 0	UG/KG	SOIL	REG	5 3000	8260A\5030	VOC	DRUM STORAGE PRE-EXPANSION
			TOTAL VOC'S	**14 0**							

SAMPLE	DATE	CAS#	COMPOUND	RESULT		UNITS			DETECTION LIMIT	METHOD		
DP-104/3-4'	20000717	541-05-9	Cyclotrisiloxane, hexamethyl-	6 8000	B	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-104/3-4'	20000717		unknown3	14 0000	B	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-104/3-4'	20000717	127-18-4	Tetrachloroethene	14 0000		UG/KG	SOIL	REG	5 4000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
			TOTAL VOC'S	34 8								
DP-104/7-8'	20000717		unknown4	9 1000	B	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-104/7-8'	20000717	127-18-4	Tetrachloroethene	43 0000		UG/KG	SOIL	REG	5 6000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-104/7-8'	20000717	79-01-6	Trichloroethene	11 0000		UG/KG	SOIL	REG	5 6000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
			TOTAL VOC'S	63 1								
DP-105/3-4'	20000717	127-18-4	Tetrachloroethene	270 0000	D	UG/KG	SOIL	REG	26 0000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-105/3-4'	20000717		unknown5	12 0000	B	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-105/3-4'	20000717	156-59-2	cis-1,2-Dichloroethene	5 8000		UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-105/3-4'	20000717	541-05-9	Cyclotrisiloxane, hexamethyl-	12 0000		UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-105/3-4'	20000717	79-01-6	Trichloroethene	42 0000		UG/KG	SOIL	REG	5 2000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-105/3-4'	20000717		unknown6	11 0000		UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-105/3-4'	20000717		unknown7	7 0000		UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
			TOTAL VOC'S	359 8								
DP-105/7-8'	20000717	541-05-9	Cyclotrisiloxane, hexamethyl-	6 3000	B	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-105/7-8'	20000717	75-09-2	Methylene chlonde	5 6000	B	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-105/7-8'	20000717		Unknown9	11 0000	B	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-105/7-8'	20000717	127-18-4	Tetrachloroethene	160 0000		UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-105/7-8'	20000717	79-01-6	Trichloroethene	20 0000		UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-105/7-8'	20000717		unknown8	6 9000		UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
			TOTAL VOC'S	209 8								
DP-106/2-3'	20000717	75-09-2	Methylene chlonde	5 3000	B	UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-106/2-3'	20000717		unknown9	9 2000	B	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-106/2-3'	20000717	127-18-4	Tetrachloroethene	100 0000		UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-106/2-3'	20000717	79-01-6	Trichloroethene	17 0000		UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-106/2-3'	20000717		unknown10	5 3000		UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
			TOTAL VOC'S	136 8								
DP-106/6-7'	20000717	127-18-4	Tetrachloroethene	590 0000	D	UG/KG	SOIL	REG	26 0000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-106/6-7'	20000717		unknown11	7 7000	B	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-106/6-7'	20000717	156-59-2	cis-1,2-Dichloroethene	11 0000		UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-106/6-7'	20000717	79-01-6	Trichloroethene	80 0000		UG/KG	SOIL	REG	5 3000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
			TOTAL VOC'S	688 7								
DP-107/2-3'	20000717	127-18-4	Tetrachloroethene	290 0000	D	UG/KG	SOIL	REG	30 0000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-107/2-3'	20000717	79-01-6	Trichloroethene	450 0000	D	UG/KG	SOIL	REG	30 0000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-107/2-3'	20000717	1000157-04-3	Cobalt, (2-methyl- eta -1-propenyl)	13 0000	B	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-107/2-3'	20000717	541-05-9	Cyclotrisiloxane, hexamethyl-	9 3000	B	UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-107/2-3'	20000717	156-59-2	cis-1,2-Dichloroethene	64 0000		UG/KG	SOIL	REG	6 0000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-107/2-3'	20000717	124-18-5	Decane	7 8000		UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-107/2-3'	20000717	1120-21-4	Undecane	7 4000		UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
			TOTAL VOC'S	841 5								
DP-108/3-4'	20000717	127-18-4	Tetrachloroethene	19 0000		UG/KG	SOIL	REG	6 0000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
DP-108/3-4'	20000717	79-01-6	Trichloroethene	47 0000		UG/KG	SOIL	REG	6 0000	8260B\5035	VOC	BUIDLING 40A INTERIOR GEOPROBING
			TOTAL VOC'S	66 0								
DP-108/7-8'	20000717		No Searchable Peaks	0 0000		UG/KG	SOIL	LIB	-999 0000	8260B	VOC	BUIDLING 40A INTERIOR GEOPROBING
			TOTAL VOC'S	0 0								

8/22/97 DVS

Gem City Chemicals July 1993 Site Assessment Report

- chemical distribution, blending & repackaging facility
- operated here > 20 years ~~(pre 1973)~~ since 1969
- surface elevation 750' ± 5' MSL
- overlies Miami Valley Aquifer = Sole Source Aquifer
- 1-mile south of Daytons Miami Well Field and is @ the southern edge of the cone-of-depression, just outside of Wellfield Protection Area
- 2-miles ~~to~~ east = Mad River Well Field, no recharge from Gem City
- there are a number of private industrial wells in the area

Site History

- Pre 1969 Air City Fuels occupied property & stored coal & Fuel oil
- UST contained leaded & unleaded gas, (No leakers) removed by Gem City Chemicals
- purchase chemicals by the truck load & repackage & sell in small quantities
- they do not manufactur chemicals, some blending of chemicals
- chemical stored in USTs & ASTs located by railroad spurs
- chemicals include a large amount of acids followed by solvents, Calcium chloride and caustics
- 8 chemicals USTs contained stoddard solvent, methyl alcohol, MEK, Xylene, acetone, toluene and isopropyl alcohol, NO chlorinated solvents ever stored in USTs. These USTs been removed
- 1987 discovered VOCs in soil & GW
- ~~late 1989~~ - early 1990 GW recovery system on line
- SVE from 1989 - 1991
- West ½ of site, soils appear clean

Geology

- Depth to bedrock estimated > 270', shales & limestones (Or Richmond Group) possibly till above bedrock, bedrock = aquitard (yields little)
- surficial sedz mostly sand & gravel
- S & G ± 80' thick w/ discontinuous till lenses @ 40-50' deep
- Continuous till layer @ 80' bg, regionally must be discontinuous

Gem City Chemical Summary

- well yields in immediate vicinity of Gem City ≈ 100-500 gpm
- Wells W-1 to W-4 drilled w/ cable tool
- till @ 80' is @ least 5' thick, & 11' thick @ MW-1 & 18' thick @ a nearby production well
- area well logs show the till to be continuous @ depths of 80-100' beneath Gem City & w/in ½ mile of Gem City
- shallow clay layer where present is above WT
- Regional studies show confined stg aquifer beneath till layer

GW Flow

- Regional flow was to SW parallel to Miami River Pre early 60's. Now to north w/ installation of well field
- Water levels prior to recovery system installation showed GW flow to northeast @ 0.0004 ft/ft
- gw flow @ site is radial toward pumping well @ 0.002 ft/ft
- Hydraulic Conductivity/Storativity

Upper Aquifer	260 ft/day,	0.2 ft/ft
Till	0.04 ft/day,	0 ft/ft
Lower Aquifer	87 ft/day,	0.00001 ft/ft

- Gem City Pump Test Feb 21 1990 Radius of influence ≈ 300'
  - 340 gpm, drawdown 3.5' from well = 0.75' after 450 min of pumping
  - T = 52900 ft²/day (395,000 gpd/ft), Conductivity = 755 ft/day
  - effective porosity of Dayton silty stg estimated @ 20% w/ storativity estimated @ 0.10 to 0.20
  - pre pumping GW flow velocity estimated @ 1.2 ft/day
  - pumping " " " " " 6.4 " "
- Potentiometric surface indicates nearly horizontal flow
- Deep aquifer flow is @ a divide beneath Gem City, flow possible to SW toward industrial wells or to N toward Miami Wild Life

- upper aquifer Flow originally to SW, gw divide was north of site, installed Miami South wellfield in early 1960's which shifted divide to south of site and flow changed to NE
- GW elevations have fluctuated by 12' (March 90 - June 93) 718 - 730 MSL rising gw table winter & spring, falling summer & fall

Wells

- 10 MW's ~~and 6 boreholes~~ PZ @ 11 locations
- 4 single MW's, two clusters of 3 wells located NE & SW of the active portion of site, 1 RW center of site, PZ's located ~~outside~~ around RW
- RW screened from ≈ 30' to 50', TD = 50', 8" diameter, drilled to 65'; 7's
- RW successful in preventing off-site migration of gw & cone-of-depression extends beyond all past & present chemical storage & transfer areas

DQ - Contaminants migrating on site from offsite source upgradient (SW)
- 1,1,1-trichloroethane, trichloroethene, tetrachloroethene, dichloroethanes and dichloroethenes increasing in upgradient well clusters (MW-6 & MW-1),

SVE - installed Oct 88, started April 89 thru Jan 90' then intermittently ~~ran 1½ years & shutoff~~, turned on in July 91 & Aug 92 & shut off after 1 week, no VOC's, decommissioned, system removed ≈ 1100 lbs VOC's

- RW removed ≈ 3,300 lbs VOC's

F.L. data for Feb 8 & 23 1993

8/25/97 DC

3chg4/dayton

Gem City summary of April - June 97 progress reports, July 97

- FL data provided from 8/90 to 6/97 (weekly)
- 300 gpm

NORMALS, MEANS, AND EXTREMES

DAYTON, OH (DAY) AIRPORT

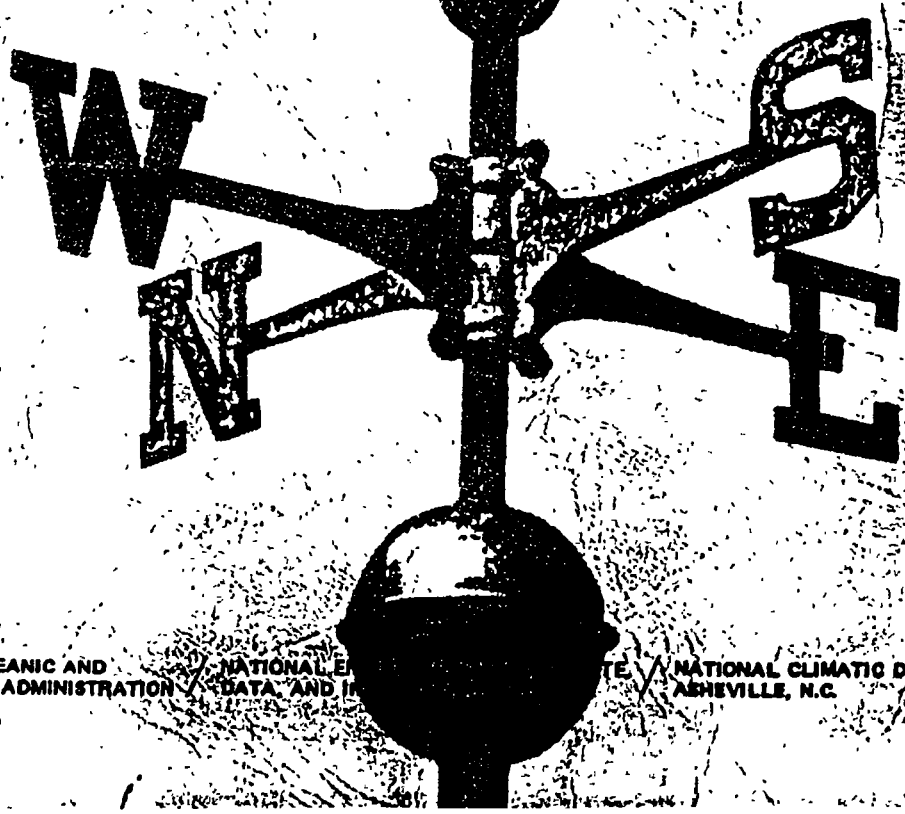
LATITUDE: 39° 54′ 22″ N LONGITUDE: 84° 13′ 07″ W ELEVATION (FT): GRND: 995 BARO: 1005 TIME ZONE: EASTERN (UTC+ 5) WBAN: 93815

	ELEMENT	POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	34.1	38.0	50.0	61.9	72.5	81.6	84.9	83.0	76.5	64.5	51.3	39.1	61.4
	MEAN DAILY MAXIMUM	49	34.9	38.7	49.1	61.7	72.2	81.5	84.9	83.3	76.5	64.8	50.5	39.2	61.4
	HIGHEST DAILY MAXIMUM	53	71	71	82	89	93	102	102	102	101	89	79	72	102
	YEAR OF OCCURRENCE		1950	1976	1986	1962	1962	1988	1988	1988	1954	1951	1975	1982	AUG 1988
	MEAN OF EXTREME MAXS.	49	57.0	61.0	72.8	81.2	86.3	92.5	94.0	92.8	89.5	80.7	70.3	60.7	78.2
	NORMAL DAILY MINIMUM	30	17.9	20.8	31.0	40.5	51.0	59.2	63.4	61.3	55.1	43.6	34.4	24.0	41.8
	MEAN DAILY MINIMUM	49	19.4	21.9	30.5	40.7	51.2	60.4	64.6	62.5	55.0	44.0	33.8	24.2	42.4
	LOWEST DAILY MINIMUM	53	-25	-16	-7	15	27	40	44	40	32	21	-2	-20	-25
	YEAR OF OCCURRENCE		1994	1951	1980	1972	1947	1990	1972	1965	1974	1962	1958	1989	JAN 1994
	MEAN OF EXTREME MINS.	49	-3.3	.3	11.9	24.6	35.1	47.3	52.8	50.2	39.0	28.9	17.4	3.0	25.6
	NORMAL DRY BULB	30	26.0	29.4	40.5	51.2	61.7	70.4	74.2	72.2	65.8	54.1	42.9	31.6	51.7
	MEAN DRY BULB	49	27.1	30.3	39.8	51.2	61.7	70.9	74.7	72.9	65.7	54.4	42.2	31.7	51.9
	MEAN WET BULB	13	25.6	28.2	35.9	45.5	55.1	63.6	62.3	60.9	58.9	44.7	38.7	29.6	45.8
	MEAN DEW POINT	13	20.9	22.7	29.5	38.9	49.4	58.4	58.3	57.3	54.5	39.6	33.8	25.5	40.7
	NORMAL NO. DAYS WITH:														
	MAXIMUM ≥ 90°	30	0.0	0.0	0.0	0.0	0.5	3.7	6.7	3.8	1.2	0.0	0.0	0.0	15.9
	MAXIMUM ≤ 32°	30	13.9	9.3	2.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.9	8.7	35.3
	MINIMUM ≤ 32°	30	27.5	23.4	18.0	6.3	0.4	0.0	0.0	0.0	*	3.7	13.6	24.3	117.2
	MINIMUM ≤ 0°	30	3.5	1.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	7.0
H/C	NORMAL HEATING DEG. DAYS	30	1209	997	760	414	185	11	0	6	73	355	663	1035	5708
	NORMAL COOLING DEG. DAYS	30	0	0	0	0	83	173	285	230	97	18	0	0	886
RH	NORMAL (PERCENT)	30	73	72	70	64	65	66	69	72	72	69	73	76	70
	HOUR 01 LST	30	75	75	74	71	74	76	79	82	81	77	77	78	77
	HOUR 07 LST	30	77	78	78	76	77	78	82	86	87	82	81	80	80
	HOUR 13 LST	30	68	66	62	54	54	53	55	57	57	56	65	71	60
	HOUR 19 LST	30	71	70	65	58	57	56	59	63	65	64	71	75	64
S	PERCENT POSSIBLE SUNSHINE	53	40	44	48	52	58	66	66	67	65	59	40	36	53
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG(VISBY ≤ 1/4 MI)	54	3.6	2.7	1.8	0.7	1.1	0.9	1.2	1.7	1.7	1.3	1.8	3.3	21.8
	THUNDERSTORMS	54	0.4	0.5	2.4	4.4	6.3	7.5	7.4	5.9	3.1	1.5	0.8	0.3	40.5
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)	0													
	MIDNIGHT-MIDNIGHT (OKTAS)	0													
	MEAN NO. DAYS WITH:														
	CLEAR	0			4.0		1.0								
	PARTLY CLOUDY	0					1.0								
	CLOUDY	1	2.0	3.0	7.0		1.0	1.0							
PR	MEAN STATION PRESSURE(IN.)	24	29.00	29.00	28.90	28.90	28.90	28.90	29.00	29.00	29.00	29.00	29.00	29.00	28.97
	MEAN SEA-LEVEL PRES. (IN.)	13	30.12	30.10	30.06	29.97	30.00	29.97	27.71	27.74	30.08	27.78	30.11	27.83	29.29
WINDS	MEAN SPEED (MPH)	44	11.4	11.2	11.7	11.2	9.5	8.7	7.9	7.3	8.1	9.0	11.0	11.1	9.8
	PREVAIL.DIR(TENS OF DEGS.)	28	27	21	29	18	22	21	24	22	18	18	21	18	21
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	1	41	40	41	39	43	37	29	25	31	38	37	33	43
	DIR. (TENS OF DEGS.)		25	28	25	27	28	01	24	31	28	25	30	26	28
	YEAR OF OCCURRENCE		1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	MAY 1996
	MAXIMUM 5-SECOND:														
	SPEED (MPH)	1	49	48	51	48	54	46	36	29	38	49	49	40	54
	DIR. (TENS OF DEGS.)		25	28	23	25	23	02	24	32	26	24	28	26	23
	YEAR OF OCCURRENCE		1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	MAY 1996
PRECIPITATION	NORMAL TOTAL (IN.)	30	2.13	2.17	3.42	3.46	3.88	3.82	3.54	3.20	2.54	2.48	3.07	2.93	36.64
	MAXIMUM TOTAL (IN.)	53	9.86	5.77	7.65	9.20	9.05	10.89	8.55	8.03	6.87	6.25	8.07	10.04	10.89
	YEAR OF OCCURRENCE		1950	1990	1964	1996	1995	1958	1990	1974	1996	1986	1985	1990	JUN 1958
	MINIMUM TOTAL (IN.)	53	0.30	0.14	1.07	0.56	1.55	0.32	0.47	0.03	0.27	0.10	0.48	0.36	0.03
	YEAR OF OCCURRENCE		1981	1947	1966	1962	1964	1962	1974	1996	1963	1944	1949	1955	AUG 1996
	MAXIMUM IN 24 HOURS (IN.)	53	4.30	2.79	2.87	3.10	3.64	3.76	4.54	3.62	2.60	3.75	2.93	2.86	4.54
	YEAR OF OCCURRENCE		1959	1959	1964	1977	1989	1981	1990	1974	1981	1986	1955	1990	JUL 1990
	NORMAL NO. DAYS WITH:														
	PRECIPITATION ≥ 0.01	30	12.6	11.1	13.2	12.2	11.6	10.2	10.3	9.7	8.3	9.4	11.6	12.9	133.1
	PRECIPITATION ≥ 1.00	30	0.2	0.3	0.4	0.6	0.8	0.9	0.9	0.8	0.6	0.4	0.5	0.5	6.9
SNOWFALL	NORMAL TOTAL (IN.)	30	8.9	7.3	5.4	0.8	T	0.0	0.0	0.0	0.0	0.3	2.1	5.2	30.0
	MAXIMUM TOTAL (IN.)	53	40.2	17.5	13.8	4.9	T	0.0	T	0.0	0.0	5.8	12.7	15.6	40.2
	YEAR OF OCCURRENCE		1978	1979	1984	1974	1995		1995			1989	1950	1960	JAN 1978
	MAXIMUM IN 24 HOURS (IN.)	53	12.2	7.7	11.3	4.7	T	0.0	T	0.0	0.0	5.0	10.0	7.6	12.2
	YEAR OF OCCURRENCE		1978	1984	1968	1974	1995		1995			1989	1950	1974	JAN 1978
	MAXIMUM SNOW DEPTH (IN.)	48	22	14	11	6	0	0	0	0	0	4	12	10	22
	YEAR OF OCCURRENCE		1978	1978	1963	1987						1989	1950	1951	JAN 1978
	NORMAL NO. DAYS WITH:														
	SNOWFALL ≥ 1.0	30	2.7	2.3	1.7	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.5	1.8	9.4

CLIMATOGRAPHY OF THE UNITED STATES NO. 81

Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1961 - 1990

OHIO



oaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / NATIONAL E... DATA AND I... / ...TE / NATIONAL CLIMATIC DATA CENTER ASHEVILLE, N.C.

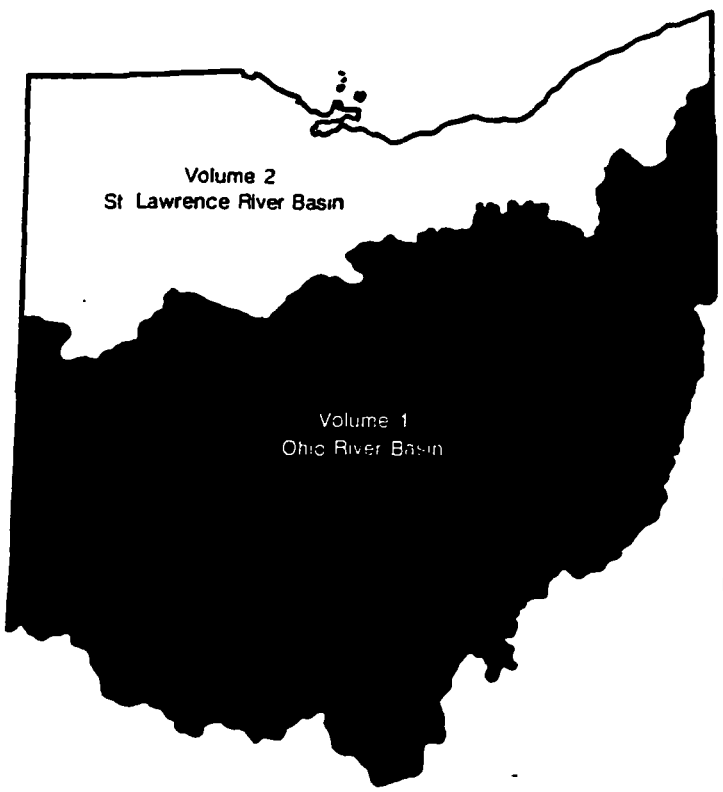
OHIO

PRECIPITATION NORMALS (INCHES)

STATION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
AKRON-CANTON WSO AP	NORMAL	2 16	2 23	3 33	3 16	3 73	3 18	4 08	3 32	3 32	2 35	3 01	2 95	36 82
	MEDIAN	1 89	2 13	3 03	2 90	3 43	2 85	3 46	3 03	3 09	2 07	2 83	2 68	35 55
ASHLAND	NORMAL	2 13	2 13	3 10	3 47	4 24	3 57	4 25	3 92	3 35	2 31	3 18	2 76	38 41
	MEDIAN	2 12	1 88	2 95	3 23	3 86	3 10	3 56	3 63	2 96	2 06	3 10	2 70	38 28
ASHTABULA	NORMAL	1 91	1 88	2 39	3 15	3 19	4 02	3 88	3 92	3 84	3 45	3 81	3 23	38 67
	MEDIAN	1 70	1 78	2 29	2 98	2 66	3 57	3 99	3 43	3 48	3 14	3 57	3 06	38 55
ATHENS	NORMAL	2 52	2 64	3 73	3 39	3 96	3 47	4 36	3 87	3 18	2 57	3 12	3 11	39 92
	MEDIAN	2 43	2 58	3 24	3 27	3 36	3 44	4 22	3 16	3 04	2 48	2.82	3 10	40 33
BARNESVILLE	NORMAL	2 52	2 67	3 69	3 95	4 45	4 39	4 83	3 70	3 27	2 94	3 52	3 22	43 15
	MEDIAN	2 38	2 70	3 55	3 81	4 13	4 23	4 21	3 29	2 78	2 73	2 99	2 90	42 27
BEACH CITY LAKE	NORMAL	2 09	2 16	3 07	3 12	3 59	3 64	4 40	4 01	3 23	2 40	3 03	2 73	37 47
	MEDIAN	1 84	2 18	2 87	2 90	3 43	3 52	3 54	3 45	2 78	2 28	2 72	2 58	36 93
BELLEFONTAINE	NORMAL	1 97	1 94	3 06	3 44	3 98	3 68	3 58	3 21	2 92	2 39	2 98	2 97	36 12
	MEDIAN	1 60	1 84	2 68	3 62	3 67	3 52	3 48	3 37	2 43	2 12	2 73	2 86	36 65
BOURNEVILLE 1 SSW	NORMAL	2 45	2 49	3 98	3 77	4 44	3 34	3 71	3 84	3 15	2 61	3 16	2 91	39 85
	MEDIAN	2 15	2 23	3 85	3 48	4 10	3 15	3 20	3 88	2 43	2 05	2 80	2 93	40 07
BOWLING GREEN	NORMAL	1 56	1 51	2 46	3 01	3 42	3 59	3 98	2 95	2 71	2 24	2 80	2 54	32 77
	MEDIAN	1 44	1 34	2 32	2 91	3 50	3 39	3 30	2 68	2 35	1 60	2 32	2 58	32 89
BUCKEYE LAKE 2 WNW	NORMAL	2 41	2 27	3 49	3 86	4 54	3 84	4 23	4 15	3 00	2 63	3 35	2 91	40 68
	MEDIAN	2 13	2 10	3 37	3 66	4 31	3 97	3 68	3 73	2 76	2 39	3 05	2 83	41 00
BUCYRUS	NORMAL	2 01	1 91	3 04	3 50	4 02	4 05	4 36	3 67	3 25	2 24	3 12	2 80	37 97
	MEDIAN	1 61	1 87	2 85	3 15	4 05	3 64	3 82	3 22	3 11	1 97	2 62	2 78	38 89
CADIZ	NORMAL	2 31	2 28	3 26	3 52	4 10	4 08	4 37	3 92	2 88	2 68	3 14	2 93	39 47
	MEDIAN	2 08	2 35	3 03	3 26	3 88	4 08	3 87	3 30	2 55	2 55	2 64	2 74	37 41
CALDWELL 6 NW	NORMAL	2 09	2 13	3 12	3 39	3 92	4 02	4 27	3 82	3 08	2 54	3 16	2 73	38 27
	MEDIAN	1 66	1 98	2 67	3 21	3 79	3 91	4 08	3 10	2 73	2 39	2 73	2 55	37 55
CAMBRIDGE	NORMAL	2 37	2 50	3 55	3 56	3 97	3 95	4 28	3 62	2 83	2 60	3 22	2 92	39 37
	MEDIAN	2 18	2 29	3 42	3 08	3 82	3 62	3 76	3 10	2 65	2 16	2 78	2 72	39 01
CANFIELD 1 S	NORMAL	1 83	1 74	2 88	3 03	3 71	3 71	4 13	3 36	3 41	2 63	3 04	2 50	35 97
	MEDIAN	1 60	1 68	2 73	2 85	3 18	3 31	3 60	3 29	3 30	2 37	2 93	2 21	36 18
CARPENTER 4 NW	NORMAL	2 35	2 48	3 58	3 58	4 31	3 62	4 58	3 80	3 48	2 60	3 06	2 96	40 40
	MEDIAN	2 32	2 08	2 99	3 27	3 82	3 71	4 67	3 12	3 09	2 38	2 74	2 73	40 45
CARROLLTON 3 NNE	NORMAL	2 19	2 20	3 29	3 16	3 81	4 01	4 48	3 59	3 22	2 51	3 18	2 87	38 51
	MEDIAN	1 98	2 15	3 23	3 08	3 71	3 68	3 93	3 09	3 06	2 21	2 88	2 75	38 42
CELINA 3 NE	NORMAL	1 97	2 03	3 14	3 59	3 55	3 46	3 60	3 29	2 80	2 26	2 89	2 82	35 40
	MEDIAN	1 55	1 96	3 40	3 08	3 34	3 38	3 39	3 02	2 51	2 15	2 40	2 62	35 38
CENTERBURG 2 SE	NORMAL	2 18	2 06	3 26	3 57	4 03	4 11	4 63	3 81	3 41	2 64	3 58	2 93	40 21
	MEDIAN	1 90	1 73	2 81	3 33	3 63	3 99	4 13	3 38	2 88	2 31	3 73	2 78	39 98
CHARDON	NORMAL	2 89	2 63	3 47	3 70	4 13	4 34	3 88	4 23	4 15	3 83	4 22	4 16	45 63
	MEDIAN	2 64	2 51	3 33	3 55	3 57	4 18	3 53	3 61	3 75	3 75	4 05	3 79	45 45
CHILO MELDAHL L & D	NORMAL	2 70	2 88	4 36	3 78	4 29	3 85	4 21	4 01	3 38	2 78	3 48	3 37	43 09
	MEDIAN	2 55	2 80	4 13	3 66	4 03	3 28	3 94	3 88	2 93	2 39	3 68	3 54	43 10
CHIPPEWA LAKE	NORMAL	2 01	2 13	3 12	3 22	3 86	3 61	3 86	3 24	3 39	2 29	3 33	3 00	37 06
	MEDIAN	1 83	1 98	3 12	3 13	4 05	3 36	3 85	2 95	3 23	2 01	3 19	2 95	36 28
CINCINNATI-FERNBANK	NORMAL	2 97	2 87	4 43	4 06	4 77	3 68	4 52	3 76	3 26	3 14	3 80	3 37	44 63
	MEDIAN	2 60	2 58	4 03	3 43	4 34	3 49	4 17	3 63	3 06	2 59	3 48	3 31	44 40
CINCINNATI-ABBE WSO	NORMAL	2 55	2 58	4 21	3 79	4 62	3 45	4 02	3 47	3 04	2 85	3 46	3 05	41 09
	MEDIAN	2 15	2 05	3 98	3 58	4 81	3 05	3 63	3 24	2 68	2 74	3 64	3 16	39 84
CIN MUNI-LUNKEN FLD	NORMAL	2 53	2 50	4 16	3 69	4 37	3 41	4 07	3 71	3 13	2 75	3 32	3 06	40 70
	MEDIAN	2 33	2 07	3 92	3 66	4 30	3 06	3 63	3 28	2 40	2 65	3 41	2 97	40 57
CIRCLEVILLE	NORMAL	2 07	2 08	3 28	3 67	4 67	3 47	3 85	3 98	3 22	2 46	3 20	2 66	38 61
	MEDIAN	1 81	2 08	2 90	3 39	4 23	3 59	3 78	3 53	2 72	2 30	3 02	2 67	37 99
CLEVELAND WSFO AP	NORMAL	2 04	2 19	2 91	3 14	3 49	3 70	3 52	3 40	3 44	2 54	3 17	3 09	36 63
	MEDIAN	1 86	2 33	2 90	3 10	3 18	3 43	3 42	3 49	3 13	2 35	2 87	2 94	36 51
COLUMBUS VALLEY CRSNG	NORMAL	2 18	1 96	3 46	3 57	4 34	3 79	4 01	4 12	3 11	2 34	3 38	2 78	39 04
	MEDIAN	1 85	1 69	3 28	3 39	4 14	3 61	3 32	3 69	2 53	2 21	3 18	2 73	38 67
COLUMBUS WSO AP	NORMAL	2 18	2 24	3 27	3 21	3 93	4 04	4 31	3 72	2 96	2 15	3 22	2 86	38 09
	MEDIAN	1 90	2 00	2 99	3 10	3 51	4 00	3 89	3 22	2 73	1 99	3 11	2 75	37 78
COOPERDALE	NORMAL	2 41	2 30	3 35	3 51	4 06	3 73	4 67	3 52	3 17	2 57	3 30	2 96	39 55
	MEDIAN	2 18	2 16	3 00	3 25	3 80	3 72	4 26	3 11	2 90	2 53	3 04	2 71	39 50
COSHOCTON 3 SSW	NORMAL	2 28	2 45	3 35	3 74	3 99	3 73	4 63	3 70	3 14	2 59	3 36	3 02	39 98
	MEDIAN	1 95	2 38	3 01	3 66	3 81	3 66	4 50	3 15	2 81	2 53	3 00	3 03	39 73
COSHOCTON AGR RES STN	NORMAL	2 11	2 09	3 15	3 32	3 77	3 66	4 23	3 32	3 05	2 34	3 00	2 65	36 69
	MEDIAN	2 14	1 98	2 80	2 97	3 85	3 55	3.53	2 81	2 81	2 10	2 74	2 23	35 80
DANVILLE 2 W	NORMAL	2 27	2 35	3 44	3 65	4 05	4 10	4 29	3 69	3 31	2 56	3 43	2 96	40 10
	MEDIAN	1 95	2 04	3 16	3 32	3 78	3 77	3 91	3 25	3 08	2 03	3 33	2 84	39 36
DAYTON (CITY)	NORMAL	2 26	2 42	3 49	3 82	4 15	3 92	4 05	3 16	2 85	2 55	3 24	2 91	38 82
	MEDIAN	1 86	2 15	3 01	3 99	3 63	3 43	3 89	2 68	2 88	2 53	2 83	2 97	38 46
DAYTON WSCMO AP AIRPORT	NORMAL	2 13	2 17	3 42	3 46	3 88	3 82	3 54	3 20	2 54	2 48	3 07	2 93	36 64
	MEDIAN	1 65	1 93	3 19	3 50	3 52	3 38	3 59	3 00	2 66	2 24	2 90	2 96	35 90

Water Resources Data
Ohio
Water Year 1996

Volume 1. Ohio River Basin Excluding Project Data



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT OH-96-1
Prepared in cooperation with the State of Ohio
and with other agencies

OHIO RIVER BASIN–Continued

03270000 MAD RIVER NEAR DAYTON, OH

LOCATION.--Lat 39°47'50", long 84°05'19", in SW 1/4 sec. 7, R. 8, T.2, Green County, Hydrologic Unit 05080001, on left bank in retarding basin 300 ft upstream from Huffman Dam, 2.3 mi downstream from Mud Run, 6.2 mi northeast of Dayton and at mile 6.1. Water-quality sampling site was on left bank 900 ft downstream.
DRAINAGE AREA.--635 mi².
PERIOD OF RECORD.--October 1914 to current year. Monthly discharge only for some periods, published in WSP 1305.
REVISED RECORDS.--WSP 453: 1915. WSP 743: 1929-32. WSP 1305: 1916(M), 1925(M) 1930-32(M). WSP 1908: Drainage area. WDR-OH-82-1: 1980.
GAGE.--Water-stage recorder. Datum of gage is 777.06 ft above sea level. Jan. 21, 1959, to Dec. 14, 1967, at site 900 ft downstream, at datum 77.01 ft lower. See WSP 1725 for history of changes prior to Jan. 21, 1959. Water-quality data collected at this site 1947-1948, 1962-1963, 1966-1980.
REMARKS.--Records excellent, except for periods of estimated record, which are poor. Flood flows affected by backwater from Huffman retarding dam beginning in 1921, some regulation by C. J. Brown Reservoir 26 mi upstream on Buck Creek since 1974. Also see REMARKS for station 03269500.
COOPERATION.--Gage-height tapes and 8 discharge measurements furnished by Miami Conservancy District.
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,200 ft³/s Jan. 22, 1959 (based on Huffman retarding basin outflow records); maximum gage height, 87.9 ft Feb. 26, 1929, at site and datum then in use; minimum daily discharge, 94 ft³/s Aug. 6, 1934, but may have been less during period 1921-24.
EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of March 25, 1913, reached a stage of 14.0 ft, original site and datum; discharge 75,700 ft³/s, computed by Miami Conservancy District.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	338	379	347	415	e740	1370	1190	4030	1240	747	1060	322
2	338	439	341	585	e700	968	1390	3000	1240	708	892	317
3	440	430	336	e500	e640	822	1040	2380	1530	703	614	316
4	453	397	332	e440	e600	741	913	3330	2530	691	573	316
5	958	386	329	e400	e580	813	883	4170	1650	680	551	316
6	1670	382	329	e380	e540	1620	814	3740	1550	671	528	305
7	841	440	329	e360	e540	1540	794	2730	2720	671	515	302
8	643	430	329	e350	663	1270	750	3470	3940	1040	498	302
9	576	376	327	e340	783	842	721	5940	2410	761	494	318
10	537	348	282	e340	699	756	690	3320	2540	606	475	312
11	509	937	e280	e330	716	723	646	5160	2290	570	467	305
12	490	1370	e270	e320	679	717	614	7080	2940	551	458	300
13	473	776	e270	e310	618	710	616	3450	1890	540	450	298
14	460	634	e270	e310	621	708	629	2750	1880	522	440	300
15	450	568	e260	e300	601	936	663	2790	2680	1270	432	358
16	433	528	e260	e300	563	835	779	3300	1820	790	428	479
17	419	487	e260	1840	540	750	737	3000	1310	714	419	763
18	413	481	e350	4270	533	698	686	2620	1280	2540	414	467
19	384	482	631	5920	530	869	717	2310	1580	1840	405	433
20	404	462	e560	2630	568	1960	1650	2100	1340	1090	399	416
21	419	446	e480	1760	658	1450	1540	1990	1150	905	360	432
22	404	422	e420	1750	636	1310	1040	1830	1070	892	351	511
23	397	408	e380	1870	642	1040	2730	1330	993	706	342	387
24	388	389	e330	4790	660	1110	4260	1420	977	664	393	369
25	381	381	e310	2800	635	1240	2000	1300	952	678	362	359
26	379	382	e310	2080	647	1010	1580	1220	878	577	352	356
27	394	379	e310	1660	1890	844	1310	1650	842	541	344	703
28	396	376	e310	1320	3180	794	1250	2000	787	649	338	1610
29	398	365	e300	e1100	1870	836	5680	2320	771	896	334	966
30	390	359	e300	e900	---	759	8510	2070	764	1300	331	676
31	381	---	e300	e800	---	727	---	1630	---	1350	329	---
TOTAL	15556	14639	10442	41470	23272	30768	46822	89430	49544	26863	14348	13614
MEAN	502	488	337	1338	802	993	1561	2885	1651	867	463	454
MAX	1670	1370	631	5920	3180	1960	8510	7080	3940	2540	1060	1610
MIN	338	348	260	300	530	698	614	1220	764	522	329	298
CFSM	.79	.77	.53	2.11	1.26	1.56	2.46	4.54	2.60	1.36	.73	.71
IN.	.91	.86	.61	2.43	1.36	1.80	2.74	5.24	2.90	1.57	.84	.80

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1996, BY WATER YEAR (WY)

MEAN	440	551	706	768	904	957	956	899	729	637	457	409
MAX	1425	1175	2027	1559	1839	1637	1561	2885	1745	1525	1235	1528
(WY)	1987	1986	1991	1991	1975	1978	1996	1996	1981	1993	1979	1979
MIN	216	235	236	239	287	344	444	268	192	211	172	217
(WY)	1989	1995	1977	1977	1992	1983	1976	1988	1988	1988	1988	1987

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR		FOR 1996 WATER YEAR		WATER YEARS 1974 - 1996	
ANNUAL TOTAL	231656		376768			
ANNUAL MEAN	635		1029		700	
HIGHEST ANNUAL MEAN					1029	1996
LOWEST ANNUAL MEAN					336	1988
HIGHEST DAILY MEAN	5340	Aug 9	8510	Apr 30	10300	Feb 24 1975
LOWEST DAILY MEAN	150	Jan 3	260	Dec 15	112	Jul 17 1988
ANNUAL SEVEN-DAY MINIMUM	177	Jan 1	267	Dec 11	124	Jul 11 1988
INSTANTANEOUS PEAK FLOW			9380	Apr 30	11400	Feb 24 1975
INSTANTANEOUS PEAK STAGE			16.79	Apr 30	19.01	Feb 24 1975
INSTANTANEOUS LOW FLOW			260	Dec 15	112	Jul 17 1988
ANNUAL RUNOFF (CFSM)	1.00		1.62		1.10	
ANNUAL RUNOFF (INCHES)	13.57		22.07		14.98	
10 PERCENT EXCEEDS	1210		2340		1310	
50 PERCENT EXCEEDS	461		646		498	
90 PERCENT EXCEEDS	296		329		256	

e Estimated

03270500 GREAT MIAMI RIVER AT DAYTON, OH

LOCATION.--Lat 39°45'55", long 84°11'51", in sec. 10, R.7, T.1, Montgomery County, Hydrologic Unit 05080002, on left bank 1,000 ft downstream from Main Street Bridge in Dayton, 0.7 mi upstream from Wolf Creek, 0.8 mi downstream from Mad River, and at mile 80.0.
DRAINAGE AREA.--2,511 mi².
PERIOD OF RECORD.--April to September 1905, January to September 1906, January 1907 to December 1909 (gage heights only), April 1913 to current year. Monthly discharge only for October 1919 to September 1921, published in WSP 1305. Gage-height records collected at Main Street Bridge since January 1892 are contained in reports of National Weather Service. Prior to October 1962, published as Miami River at Dayton.
REVISED RECORDS.--WSP 1385: 1917. WSP 1908: Drainage area.
GAGE.--Water-stage recorder. Datum of gage is 700.00 ft above sea level as requested by cooperator (699.71 ft adjustment of 1929). Prior to Oct. 1, 1921, nonrecording gage at Main Street Bridge at datum 23.73 ft higher. Oct. 1, 1921, to July 24, 1931, nonrecording gage at Main Street Bridge at datum 21.00 ft higher.
REMARKS.--Records good except estimated discharges, which are poor. Flood flow regulated by four retarding basins upstream from station beginning in 1920 on Mad River 6.5 mi upstream, on Stillwater River 10.5 mi upstream, on Great Miami River 11.5 mi upstream, and on Loramie Creek 40 mi upstream. Also see REMARKS for stations 03261500, 03261950 and 03269500. Water is diverted 6 mi upstream from station for use in Dayton; much of the flow is diverted to the Little Miami River Basin through the Dayton sewer systems. Sediment data collected at this site. U.S. Army Corps of Engineers satellite telemeter at station.
COOPERATION.--Gage-height charts, tapes, and 7 discharge measurements furnished by Miami Conservancy District.
EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 26, 1913, reached a stage of 29.0 ft, site and datum then in use; discharge, 250,000 ft³/s, computed by Miami Conservancy District.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	521	700	917	e1000	2300	8220	4820	24600	4300	1580	1780	448
2	491	852	889	1660	e2000	4780	8500	18800	3640	1490	1520	436
3	794	1310	874	1810	e1700	3490	5430	14200	3980	1410	1150	426
4	811	1930	858	e1400	e1500	2580	3930	14300	5210	1360	1060	448
5	2380	1540	833	e1200	e1400	2550	3260	16800	4810	1310	995	477
6	8230	1200	820	e1200	e1400	4830	2890	16400	4360	1270	956	467
7	7620	1230	794	e1100	e1500	6380	2590	13500	7750	1250	901	457
8	3870	2090	776	e1000	e1700	4260	2360	12700	11200	1980	859	444
9	2470	1990	747	e980	2130	2800	2180	19200	8910	1500	815	502
10	1750	1490	e500	e920	2170	2340	2050	15200	11500	1200	782	557
11	1380	3810	e490	e900	2180	2170	1920	18600	10300	1060	773	526
12	1170	11800	e490	e860	2150	2050	1820	24200	11900	977	729	503
13	1070	7350	e560	e860	1800	2080	1770	14400	8830	943	734	474
14	985	4590	e700	e960	1720	2100	1720	9740	6570	918	714	445
15	921	3410	823	e1200	1640	2800	1780	7540	8980	2110	698	484
16	884	2640	805	1210	1500	2560	1920	10000	5250	1470	675	828
17	865	2070	760	5730	1390	2280	1840	9390	3810	1220	652	1410
18	843	1900	1010	19400	1340	2060	1780	8500	3320	5880	635	857
19	796	2470	1570	27400	1330	2400	1760	6820	3570	8150	629	775
20	799	2160	1630	25400	1440	5780	4870	5570	3210	4760	623	675
21	831	1880	1580	21400	1530	6600	7200	4760	2700	3350	590	670
22	913	1660	1440	15300	1590	5930	4400	4100	2480	2920	548	995
23	843	1490	1210	12900	1780	4860	9290	3260	2270	2430	522	701
24	787	1310	1130	19400	2050	4970	21000	3530	2190	2010	649	641
25	745	1240	1050	18600	2170	8660	17500	3360	2120	1850	577	621
26	720	1160	e880	13100	2160	8930	12700	4060	2170	1480	569	641
27	753	1120	e800	8740	7180	5180	8520	5190	1960	1300	555	1390
28	746	1110	e760	6330	16600	3640	5660	8730	1790	1240	533	3560
29	741	1040	e740	4780	13700	3320	18700	9490	1700	1460	511	2150
30	733	984	e720	4040	---	2880	29800	8920	1630	2020	487	1460
31	709	---	e700	2940	---	2670	--	5960	--	2450	469	---
TOTAL	47171	69526	27856	223720	83050	126150	193960	341820	152410	64348	23690	24468
MEAN	1522	2318	899	7217	2864	4069	6465	11030	5080	2076	764	816
MAX	8230	11800	1630	27400	16600	8930	29800	24600	11900	8150	1780	3560
MIN	491	700	490	860	1330	2050	1720	3260	1630	918	469	426

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1930 - 1996, BY WATER YEAR (WY)

MEAN	708	1356	2114	3302	3431	4124	3940	2726	2132	1489	944	608
MAX	5792	8047	9210	17060	9842	11060	9727	11030	12150	7510	5727	2862
(WY)	1987	1973	1991	1937	1950	1963	1964	1996	1958	1993	1979	1979
MIN	148	195	239	263	314	557	852	373	259	216	196	164
(WY)	1964	1964	1964	1945	1964	1941	1971	1941	1988	1954	1988	1963

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR		FOR 1996 WATER YEAR		WATER YEARS 1930 - 1996	
ANNUAL TOTAL	908756		1378169			
ANNUAL MEAN	2490		3765		2233	
HIGHEST ANNUAL MEAN					4156	1973
LOWEST ANNUAL MEAN					634	1954
HIGHEST DAILY MEAN	31300	Aug 10	29800	Apr 30	57100	Jan 22 1959
LOWEST DAILY MEAN	220	Jan 5	426	Sep 3	109	Aug 8 1934
ANNUAL SEVEN-DAY MINIMUM	284	Jan 4	451	Sep 2	118	Sep 25 1941
INSTANTANEOUS PEAK FLOW			30600	Apr 30	60900	Jan 22 1959
INSTANTANEOUS PEAK STAGE			31.60	Apr 30	36.00	Jan 22 1959
INSTANTANEOUS LOW FLOW			406	Sep 3	109	Aug 8 1934
10 PERCENT EXCEEDS	5610		9560		5130	
50 PERCENT EXCEEDS	1310		1750		1010	
90 PERCENT EXCEEDS	566		641		312	

e Estimated

G Miami R At Dayton Oh

Station Information

Station Number	Latitude (ddmmss)	Longitude (dddmmss)	County	Basin Name	Drainage Area (miles^2)	Datum (ft above NGVD)
03270500	394555	0841151	Montgomery	Lower Great Miami	2511.00	700.00

Data Types Available

- Historical Streamflow Daily Values
- Peak Flow
- Map of region surrounding station
- Current Conditions Data
- EPA "Surf Your Watershed" for Lower Great Miami.
- Daily Value Statistics

Peak flow data should now appear on the correct station pages. (3/5/98)

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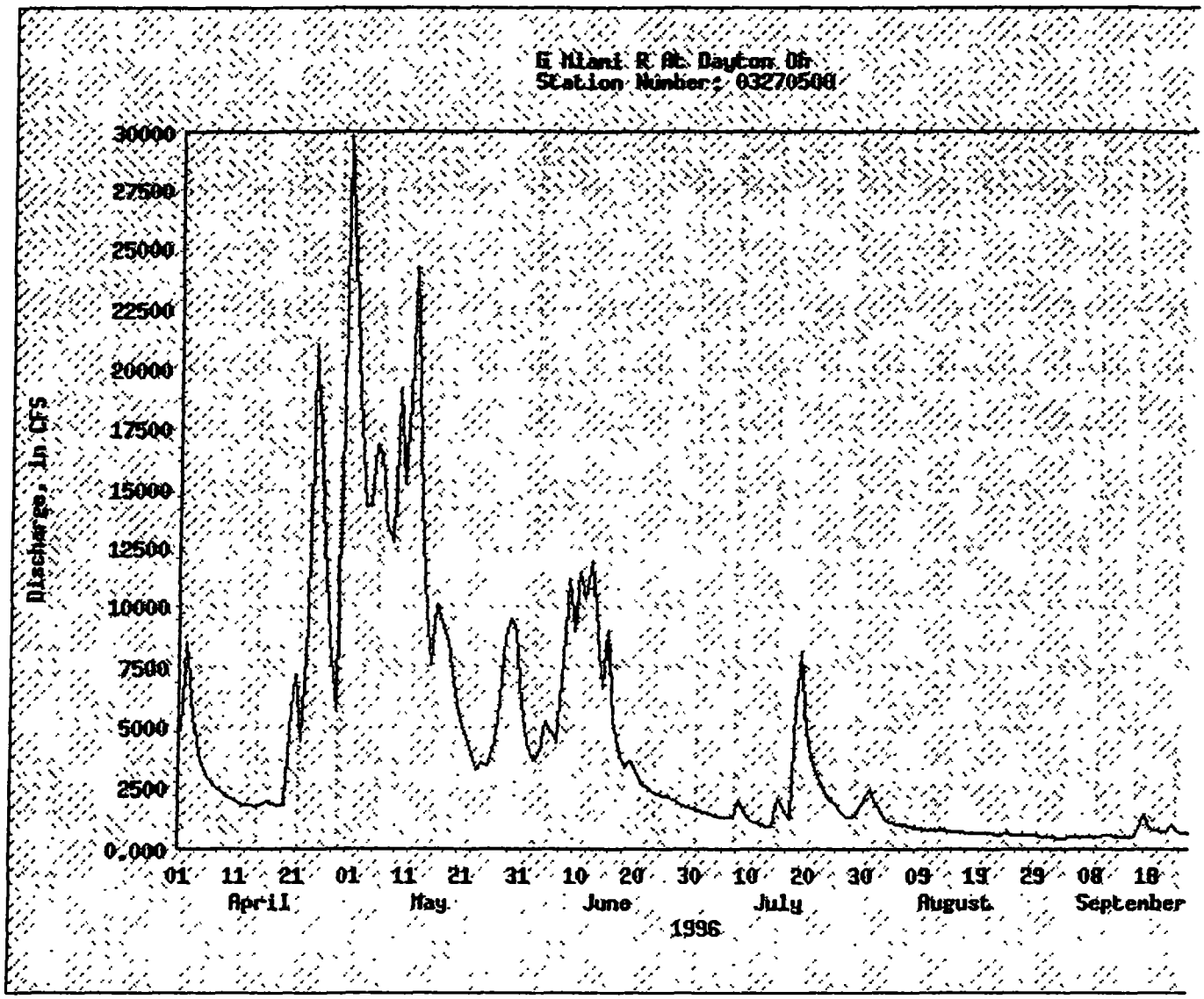
Historical Streamflow Daily Values Graph for G Miami R At Dayton Oh



Some stations have red data points. These represent days for which data was estimated, rather than recorded.

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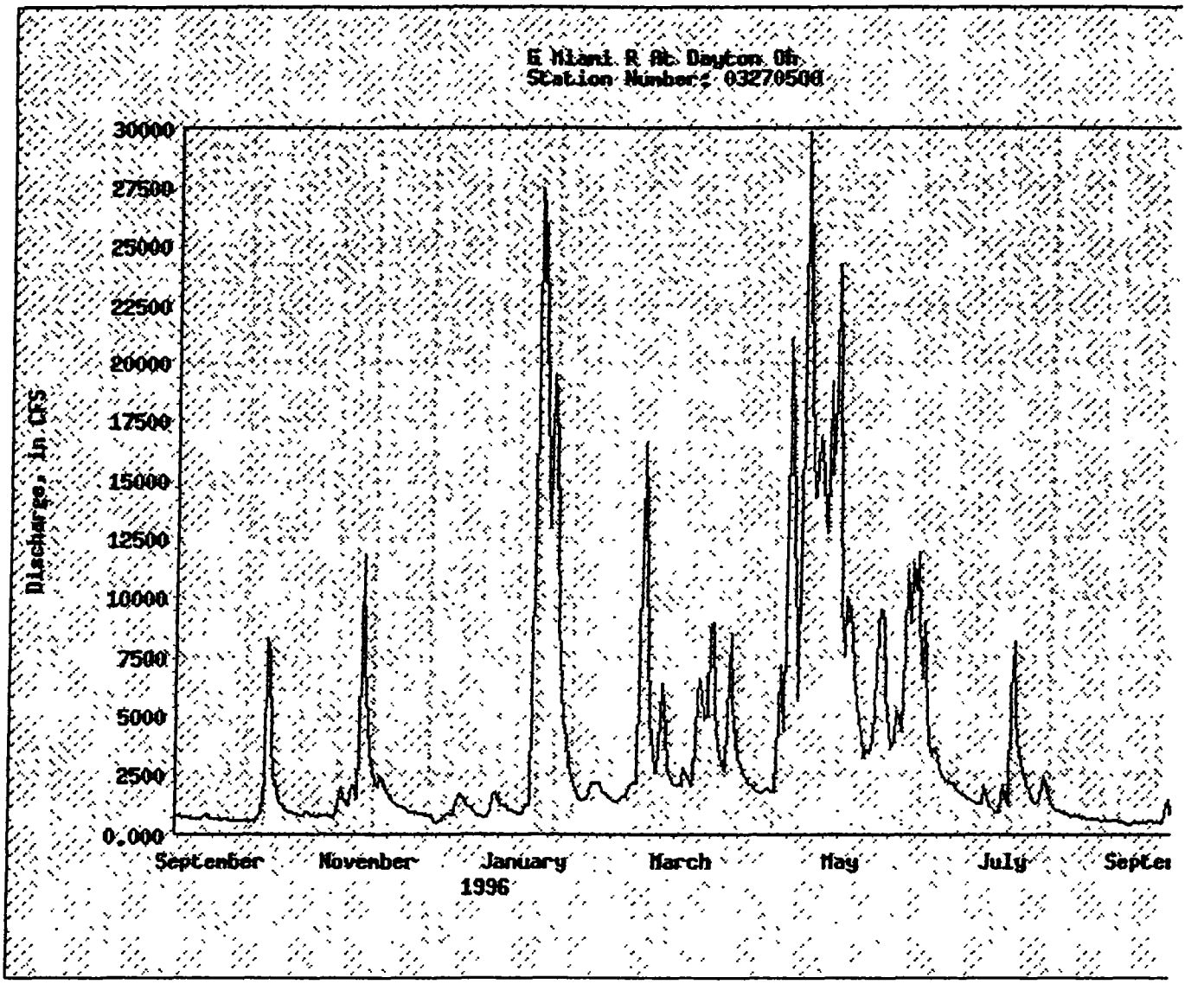
Historical Streamflow Daily Values Graph for G Miami R At Dayton Oh



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Go to the Ohio Water Resources page

Mad R Nr Dayton Oh

Station Information

Station Number	Latitude (ddmmss)	Longitude (dddmmss)	County	Basin Name	Drainage Area (miles^2)	Datum (ft above NGVD)
03270000	394750	0840519	Greene	Upper Great Miami	635.00	777.05

Data Types Available

- Historical Streamflow Daily Values
- Peak Flow
- Map of region surrounding station
- Current Conditions Data
- EPA "Surf Your Watershed" for Upper Great Miami.
- Daily Value Statistics

Peak flow data should now appear on the correct station pages. (3/5/98)

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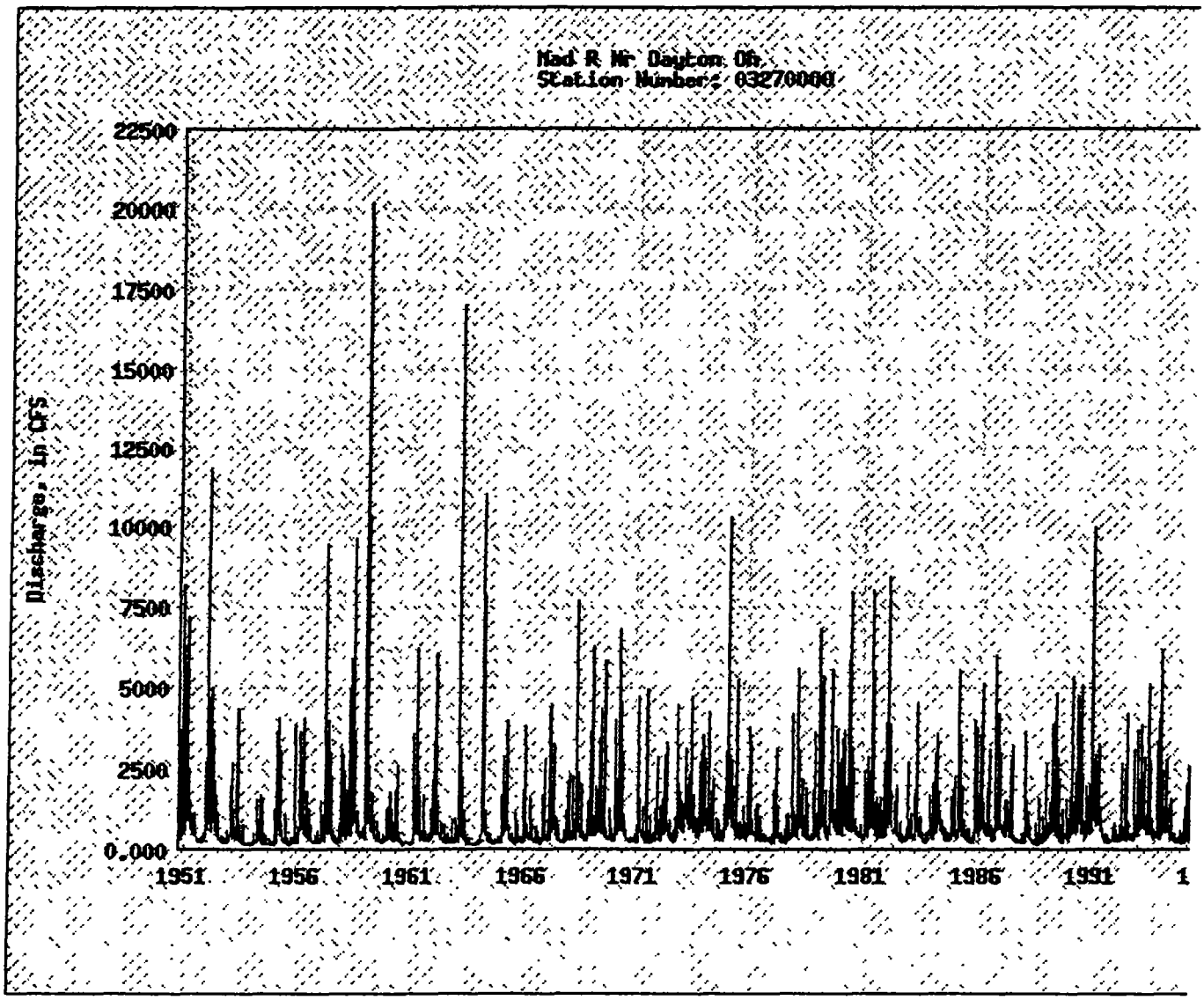
Historical Streamflow Daily Values Graph for Mad R Nr Dayton Oh



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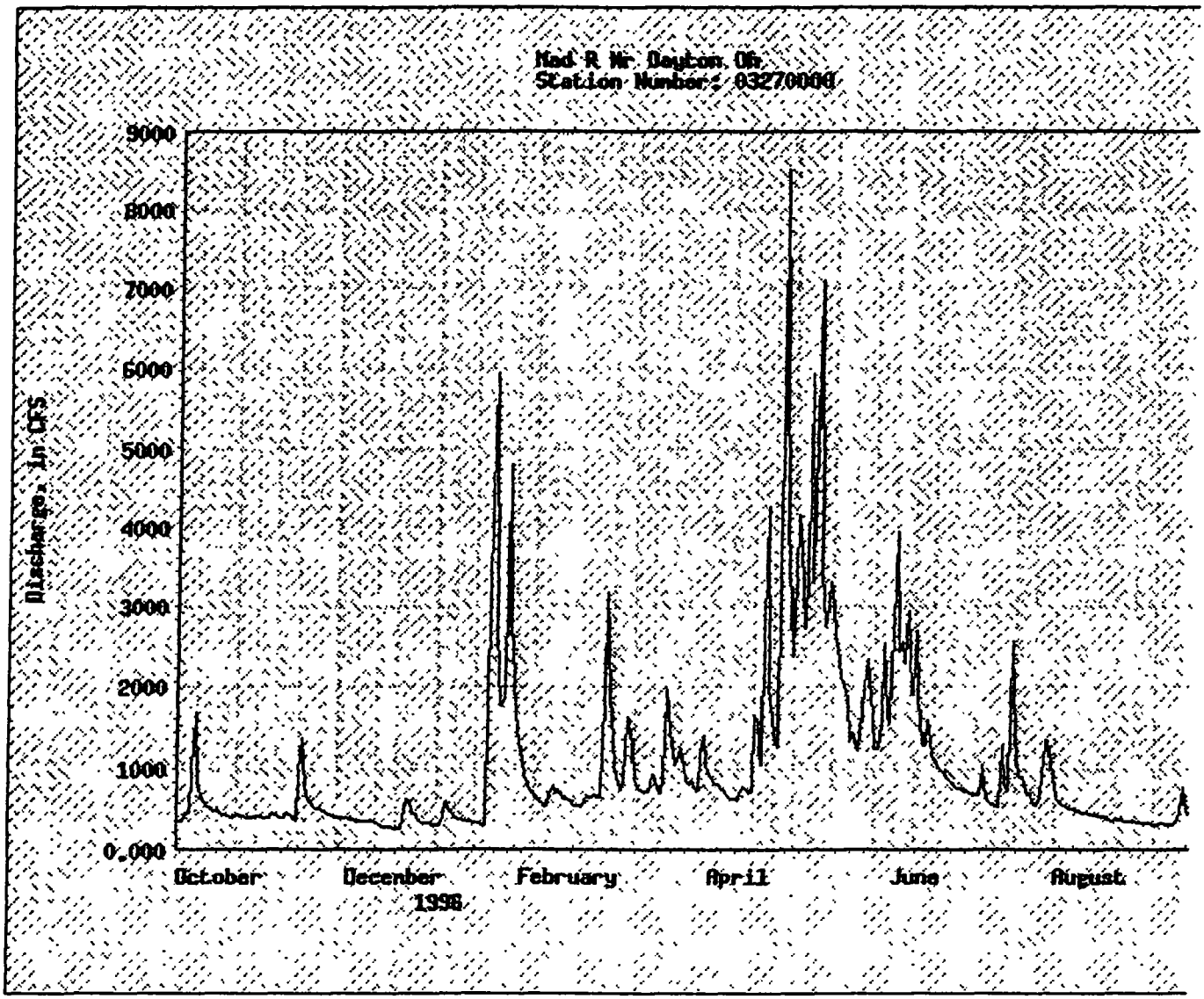
Historical Streamflow Daily Values Graph for Mad R Nr Dayton Oh



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Go to the Ohio Water Resources page

3chry4 / dayton

Source Areas of Contam from Previous Reports 1/15/98 dv

June 28 91 John Mathes Recon Invest. GW flow to South @ 5-40'/mile

1. East foundation of Bldg 40B = Freon Degreaser (Bays K-3,4,5)
2. 1,1,1 - TCA Degreaser NE side of Bldg 40A (Bay H-12)
3. Central portion of Bldg 40B
4. SW portion of Bldg 59
5. Bldg 40A & 40B
6. Area South of Bldg 53 adjacent to 1,1,1-trichloroethane tank
7. Storage area east of Bldg 50

Sept 95 Cleantech SI Report pg 98

1. Southside of Bldg 53 & N side of Bldg 40 - TCA tank & TCA tank sludge
2. S. end Bldg 53 - TCE degreaser station
3. NE area Bdg 40A - TCA degreaser
4. Middle 40A - CFC-113 degreaser
5. Bldg 47 - 500 gallon chromium paint sludge spill
6. Bldg 50 - overfill TCA storage tank (unknown quantity)
7. New Bldg 50 - ±35 gallons untreated wastewater containing flush rinse water
8. Next to Bldg 53 - unspecified quantity of TCA from a tank
9. Primary is TCA tanks, Secondary east of Bldg 50, waste storage area near Bldg 47

S:\TECH\3CHRY\DAYTON\INPROG\SOURCES.TCE

DETACH AND SAVE FOR LATER USE

Suspected source areas were determined by elevated PID readings and concentrations of the compounds in soil samples collected from shallow depths (1 to 6 feet bg)??, and from other published reports and correspondence. Previous investigations have identified the following areas as potential source areas:

John Mathes Recon Investigation, June 28, 1991;

- **east foundation of Building 40B, freon degreaser**
- **northeast side of Building 40A, 1,1,1-TCA degreaser**
- **central portion of Building 40B**
- **southwest portion of Building 59**
- **Building 40A and 40B**
- **south of Building 53, adjacent too 1,1,1-TCA tank**
- **storage area est of Building 50**

Clean Tech Site Investigation Report, September 1995;

- **south side of building 53 and north side of Building 40, TCA tank and TCA sludge tank,**
- **south end of Building 53, ~~TCA~~ degreaser station**
- **northeast area of Building 40A, TCA degreaser**
- **middle of Building 40A, CFC-113 degreaser**
- **Building 47, 50 gallon chromium paint spill**
- **Building 50, overfill TCA tank (unknown quantity)**
- **near Building 50, 35 gallon untreated flux rinse wastewater**
- **near Building 53, unspecified quantity of TCA from a tank**
- **primary is TCA tanks, secondary east of Building 50, waste storage area near Building 47**

3chry4 / dayton

- Source Areas of Contam from Previous Reports 1/15/98 dv

June 28 91 John Mathes Recon Invest. GW flow to South @ 5-10'/mile

① East foundation of Bldg 40B = Freon Degreaser (Bays K-3, 4, 5)
② 1,1,1 - TCA Degreaser NE side of Bldg 40A (Bay H-12)
③ Central portion of Bldg 40B
④ SW portion of Bldg 59
⑤ Bldg 40A & 40B
⑥ Area South of Bldg 53 adjacent to 1,1,1-trichloroethane tank
⑦ Storage area east of Bldg 50

Sept 95 Cleantech SI Report pg 98

① Southside of Bldg 53 & N side of Bldg 40 - TCA tank & TCA tank sludge
② S. end Bldg 53 - TCE degreaser station
③ NE area Bdg 40A - TCA degreaser
④ Middle 40A - CFC-113 degreaser
⑤ Bldg 47 - 500 gallon chromium paint sludge spill
⑥ Bldg 50 - overfill TCA storage tank (unknown quantity)
⑦ New Bldg 50 - ±35 gallons untreated wastewater containing flush rinse water
⑧ Next to Bldg 53 - unspecified quantity of TCA from a tank
⑨ Primary is TCA tanks, Secondary east of Bldg 50, waste storage area near Bldg 47

3chvy4 / dayton

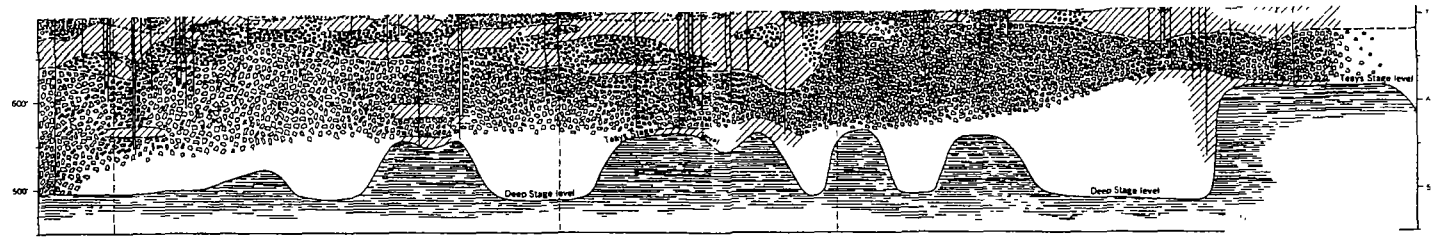
Source Areas of Contam from Previous Reports 1/15/98 JV.

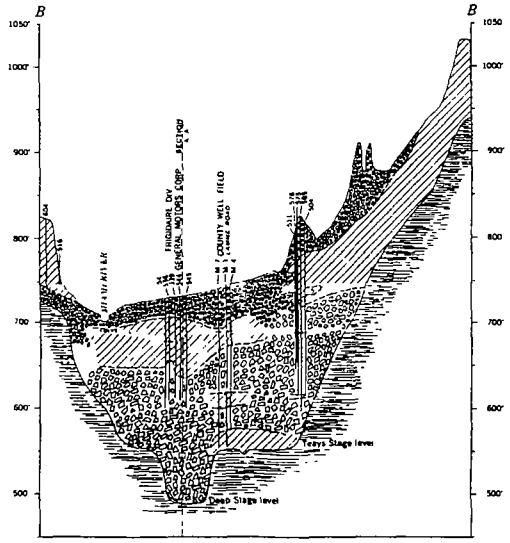
June 28 91 John Mathes Recon Invest. GW flow to South @ 5-10'/mile

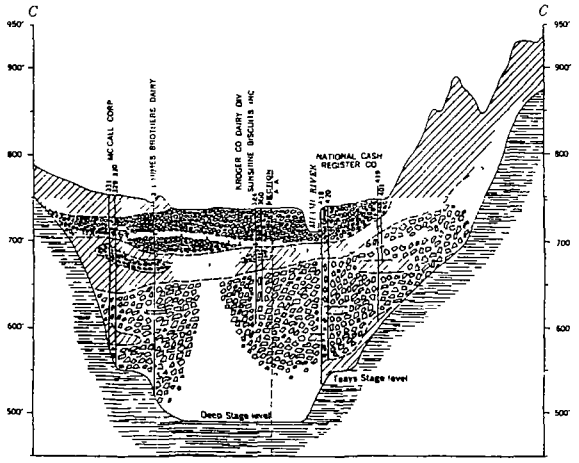
1. East foundation of Bldg 40B = Freon Degreaser (Bays K-3,4,5)
2. 1,1,1 - TCA Degreaser NE side of Bldg 40A (Bay H-12)
3. Central portion of Bldg 40B
4. SW portion of Bldg 59
5. Bldg 40A & 40B
6. Area South of Bldg 53 adjacent to 1,1,1-trichloroethane tank
7. Storage area east of Bldg 50

Sept 95 Cleantech SI Report pg 98

1. South side of Bldg 53 & N side of Bldg 40 - TCA tank & TCA tank sludge
2. S. end Bldg 53 - TCE degreaser station
3. NE area Bdg 40A - TCA degreaser
4. Middle 40A - CFC-113 degreaser
5. Bldg 47 - 500 gallon chromium paint sludge spill
6. Bldg 50 - overfill TCA storage tank (unknown quantity)
7. New Bldg 50 - ±35 gallons untreated wastewater containing flush rinse water
8. Next to Bldg 53 - unspecified quantity of TCA from a tank
9. Primary is TCA tanks, Secondary east of Bldg 50, waste storage area near Bldg 47







EXPLANATION

Upper aquifer

Sand and gravel deposits occurring at or near the surface, generally overlies the till rich zone

Till rich zone

Fairly widespread sheets lenses and masses of till, contains pockets and lenses of sand and gravel, occurs as a layer of low permeability and generally separates the sand and gravel deposits into an upper and a lower aquifer

Lower aquifer

Sand and gravel deposits generally occurring between the till rich zone and bedrock contains interbedded lenses and masses of till and clay especially near the bedrock surface

Shale of Ordovician age with thin interbedded limestone layers

Geologic contact

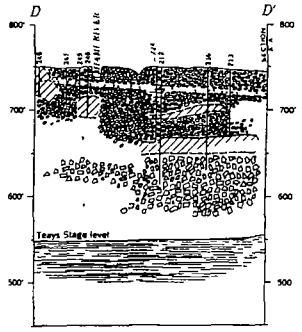
Dashed where approximate

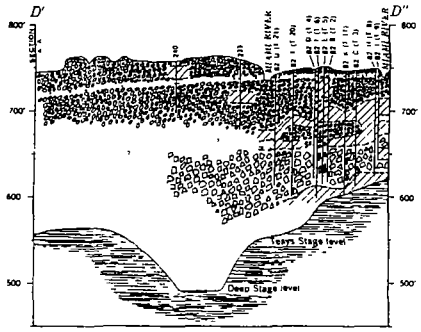
Piezometric surface in lower aquifer

Based on water-level measurements made in October 1959 represents the water table where the till rich zone is absent Datum is mean sea level

Well

Number refers to well listed in the section "Records of Wells in the Dayton Area"





GEOLOGIC SECTIONS THROUGH THE MIAMI RIVER AND MAD RIVER VALLEYS, OHIO

For location of geologic sections see plate 1

1 ¼ 0 1 2 MILES

1 5 0 1 2 KILOMETERS

DATUM IS MEAN SEA LEVEL

777-015 O 66 (In pocket)

Inter Company Correspondence

Telephone: X-2459 Date: September 06, 1989

To — Name & Department: Neil P. McKay, Environmental Planning & Compliance Specialist — CMS Number: 416-15-14
Luther L. Blair, Manager Environmental Planning — 404-02-01

From — Name & Department: D. Scott Morse, Plant Engineer
Manufacturing Engineering Dept. Acustar Dayton Thermal Products — CMS Number: 478-05-00

EXHIBIT #1

Subject: BUILDING 40 POST HOLE

I am sending you the materials which you requested on your recent visit to the Dayton Thermal Products Plant. Please note that we are in the process of upgrading some of our Plant Engineering Drawings to a CAD format, and because of this, some materials may not be 100% up-to-date.

The average elevation of the finished plant floor in Building 40 is 752'-8" above mean sea level according to prints for Building 40. There is some variation in the building floors for drainage, and some variation from building to building. I estimate that variations would not exceed +/- 6".

The following items are included in this package:
Exhibit #

1. This (Exhibit #1) memo. (2 Sheets)
2. Transcript of George Higgs' notes on this problem. (2 Sheets)
3. Copy of Memo from D. Scott Morse which was issued to Maintenance concerning dipping out of hole.
4. Copy of SPEEDIMEMO from Doug Orf to Denny Morrow on same subject.
5. Copy of Doug Orf's notes on Amount of materials dipped out of hole.
6. Notes on River Levels based on data from the Miami Conservancy District.
7. Copies of Chemical Analysis of liquids dipped from post hole. (9 Sheets)
8. Copies of Well Data from Moody's of Dayton, Inc. (2 Sheets)
9. Copy of Airtemp Division Well Report.
10. Xerox of photo showing installation of storm and sanitary sewers when Building 40A was built. (Building 40B was built soon after, and sewer installation was similar according to "old-timers".)

84-110-7879 Rev 3-83

Exhibit #

11. Copy of Equipment Records for Circo Degreaser. (3 Sheets)
Note that equipment was put on the availability list 8-31-82, and was later scrapped from the plant.

12. Copy of O'Brien and Gere Report dated December 8, 1987. (21 Sheets)
Note: Several pages in our copy are too faint to read, and several pages are duplicates of data we have provided separately.

13. Plant Layout showing location of two (2) wells, six (6) underground storage tanks, and location of detail drawings listed below.

14. Departmental Layout (not fully current) showing east end of Building 40B with all process equipment.

15. Detail Drawing, 1/4" per foot GC14 showing machines and boundaries of drainage decks above floors which might be a source of water, as well as the "post hole".

16. Detail Drawing, 1/4" per foot GC14 showing known underground pipelines, conduits, etc. as well as the "post hole". Note that when only approximate locations are known, dashed lines are used. Additional underfloor piping is probably present.

17. Detail Drawing, 1/4" per foot GC13 showing above the floor machines and drain deck boundaries which are possible sources of water. This drawing also shows the location of the Circo Degreaser as indicated on an obsolete plant layout marked "Existing Arrangement" but which was updated.

18. Detail Drawing, 1/4" per foot GC13 showing known underground pipelines, conduits, etc. Note that when only approximate locations are known, dashed lines are used. Additional underfloor piping is probably present.

D. Scott Morse, Plant Engineer
Manufacturing Engineering Dept.

Attachments

EXHIBIT #2

BLDG. 40B TRICHLOROETHANE EPISODE

1987

11/19 Cut hole in floor

11/20 Gathered sample of liquid in hole sent it out to Howard Lab.

11/24 Got sample report back from Howard - Liquid has 10.9 PPM Trichloroethane.

11/25
- Verified sample point with J. Lion
- Called S. Enders, notified him of our finds.
- Had conference call with Drees, Higgs, Remboski and J. Heckathorne (O'Brien and Gere). Discussed problem and game plan. O&G to get geologist in to evaluate problem. Higgs ask Remboski if EPA should be notified of our sample test? He said no but would confirm with Corp. Legal.
- Remboski called back confirmed that we do not have sufficient information to report to EPA at this time (per Legal - Grice).
- Heckathorne called - O&G will be in Monday, November 30, 1987.

11/30 O&G - Deborah Wright came in Plant

12/02 Received call from O&G - Heckathorne - advised to pump out hole (maybe twice if necessary). If liquid does not reappear fill it and slab over - written report to follow.

12/03 Called Remboski - informed him of O&G phone call. He concurs with O&G to pump out hole.

12/04 Hand dipped out liquid in hole (approx. 3 gal.).

12/07 Hole was full - hand dipped again (approx. 3 gal.).

12/08 Checked hole - it is filling again (concrete still exposed).

12/08 Received test results from December 1, 1987 sample Trichloroethane is 6.7 PPM.

12/08 Called Remboski - informed him we had emptied the hole twice and that it's filling again. Report Trichloroethane amount of 6.7 PPM. He said to call O&G.

12/08	Called Jim Heckathorne (O&G) reported dipping of hole and refill condition. Heckathorne suggested we continue emptying the hole. How long? He said he would fax their field report and we (Dayton and Corporate) and O&G should discuss further means.
12/08	Called Remboski - no answer.
12/09	Called Remboski - advised him of gallonage removed on December 4 and December 7, 1987. Told him we still didn't hear from O&G.
12/09	Got faxed copy of report from O&G.
12/10	Called Remboski - Told him we received O&G's report, so did he. I ask if we should notify EPA? He said he would review the report with Carlson and Legal and call me back.
12/14	Called Remboski - no answer.
12/21	Called Enders - He advised to continue pumping hole until it stops. Then fill it with concrete. I ask if we should notify the EPA, Ender said it was not required.

EXHIBIT #3

June 30, 1988

To: D. Morrow, Supervisor, Maintenance

From: D. S. Morse, Plant Engineer

Subject: DIPPING OIL FROM POST HOLE, BUILDING 40B

It is a requirement that on a regular basis of at least once every two weeks, we dip the oil solution from the post hole in building 40B.

When pumped out, the solution shall be placed in a 55 Gallon drum and treated as hazardous waste.

A log must be maintained on this process which includes:

Height of solution below floor level before being dipped.

Estimate of amount of solution removed.

Date and time solution was removed.

This log is required to plan future actions required to eliminate this problem in the future.

\M\Mult\Oilwell

CC: G. Higgs
D. Orf

LETTER ☐ MEMO ☐ SPEEDIMEMO ☐ TELEGRAM ☐ PHONE CALL ☐ CONFERENCE ☐

SPEEDIMEMO 8/[illegible]

TO: DENNY MORROW — LOCATION: ACUSTAR - DAYTON MAINTENANCE

FROM: DOUG ORF — LOCATION: ACUSTAR - DAYTON ENVIRONMENTAL

(DATE)

SUBJECT: PUMPING OF TRICHLOROETHANE WASTE FROM DEPT 9225 POST HOLE

MESSAGE

We need to continually pumpout and maintain a log for the oil and trichloroethane waste seeping into the post-hole in Bldg. 40B. As you know, we had a problem on Wednesday, August 3. The waste was overflowing the hole and seeping from cracks in the floor. Apparently, the hole had not been pumped out for quite some time. The June 30, 1988 memo from Scott Morse (attached) identifies procedures recommended by O'Brien + Gere (consultants) to be followed so that final resolution of the problem can be determined.

We do not want this hazardous waste spilling on the floor and being tracked throughout the plant. We also need to quantify the rate of waste generation. We will routinely have the waste analyzed to determine whether the concentration of trichloroethane is decreasing. THANK YOU

ORIGINATOR - DO NOT WRITE BELOW THIS LINE — SIGNED Doug Orf

cc Scott Morse
George Higgs

REPLY

SIGNED — DATE

84-113-0003 (9/77)

Exhibit 4

EXHIBIT #5

MIAMI VALLEY PRESSURE CLEANING INC.

P O Box 938
Troy Ohio 45373

513-832 3600
513-335-1222

TRUCK FLEETS ■ BUILDINGS ■ HEAVY EQUIPMENT ■ WATER BLASTING

8/29/89

To: Lou Rizi

From: Doug Gf

Since August 1988, we have extracted liquid from the post hole in Bldg 45 B 4 times. Total quantity of material extracted from these 4 withdrawals was approximately 5 gallons. Larger quantities were extracted before we began measuring this information.

Doug Gf

WE GIVE QUALITY SERVICE

EXHIBIT #6

In the Dayton Area, the Miami Conservancy District built and maintains floor protection devices, and serves other functions along the lines of the U.S. Army Corp of Engineers.

High and low river levels are maintained by their engineers as taken behind the YMCA Building (the closest official recording point to our plant).

According to their records, the highest river level during the last two years was 731.5 feet above mean sea level and the lowest was 725.17 feet above mean sea level.

This information collected by Doug Orf, August 14, 1989, from Keith Pastor at the Miami Conservancy District (513) 223-1271.

D. Scott Morse
8/16/89 6/006

EXHIBIT #A

PAGE 1 HOWARD LABS INC REPORT LAB # 87-11-A27

RECEIVED: 11/23/87 11/25/87 18:03:18

CLIENT CHRYSLER SAMPLES 2
COMPANY Chrysler Corporation
FACILITY Power Train Division

REPORT TO Chrysler Corporation (5407)
1600 Webster Street
Dayton, Ohio 45404

ATTEN John Lion

WORK ID #11-23-87-1 & #11-23-87-2
TAKEN 11/23/87
TRANS Delivered
TYPE Aqueous
P.O. # A-874306188-A
INVOICE under separate cover

PREPARED BY HOWARD LABORATORIES, INC.
3601 South Dixie Drive
P.O. Box 369
Dayton, OH 45449
PHONE 513-294-6856

Jackie D. Webster
CERTIFIED BY

CONTACT J ANDREJCIO

Enclosed are the results of specified samples submitted for analyses. If you have any questions, please advise. Use the "LAB #" for faster identification.
OHIO EPA CERTIFICATION: CHEMICAL 4074 BACTERIOLOGICAL 857

SAMPLE IDENTIFICATION	
01	#11-23-87-1
02	#11-23-87-2

HOWARD LABS INC TEST CODES and NAMES used on this report

GCMS	GCMS Scan
VOAMSC	GC/MS SCAN TOTAL VOLATILES

Diked area waste oil (=#1
Hole in concrete = #2

1st Sample 11/20/87

RECEIVED: 11/23/87
Results by Sample

SAMPLE ID #11-23-87-2 FRACTION 02A TEST CODE GCMS NAME GCMS Scan
Date & Time Collected 11/23/87 Category

DATA FILE E0356 VERIFIED BY DLH
DATE INJECTED 11/24/87 ANALYST WMC

oil

COMPOUND	RESULT	UNITS
Mixed alkanes	42,700.0	mg/Kg
No other compounds detected with a detection limit of 44.0 mg/Kg.		
NOTE: This sample was taken from the oil layer.		

Hole IN CONCRETE

The following are inter-laboratory QA/QC results for EPA Method 625/1625.

COMPOUND	RESULT	CODE
nitrobenzene-d5	68.8 %	S1B
2-fluorobiphenyl	77.2 %	S2B
terphenyl-d14	71.5 %	S3B
phenol-d5	92.6 %	S1A
2-fluorophenol	101.0 %	S2A
2,4,6-tribromophenol	96.8 %	S3A

CODES - Surrogate compounds for GC check.

HOWARD LABS INC REPORT LAB # 87-11-A27

RECEIVED: 11/23/87

Results by Sample

SAMPLE ID #11-23-87-2 FRACTION 02A TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 11/23/87 Category

DATA FILE B1086

DATE INJECTED 11/24/87 ANALYST CMH

VERIFIED BY DLH

Hole IN CONCRETE

COMPOUND	RESULT	UNITS
1,1-Dichloroethene	135.0	ug/L
1,1-Dichloroethane	2,800.0	ug/L
1,1,1-Trichloroethane	10,900.0	ug/L
Trichloroethene	308.0	ug/L
1,1,2-Trichloroethane	43.8	ug/L
Tetrachloroethene	286.0	ug/L
1,2-Dichlorobenzene	14.3	ug/L
Cis-1,2-dichloroethene	2,470.0	ug/L
Methyl Ethyl Ketone	288.0	ug/L
No other volatile compounds		
detected with a detection		
level of < 12.5 ug/L.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	65.0 %	S1V
toluene-d6	91.4 %	S2V
bromofluorobenzene	120.0 %	S3V

CODE SV - Surrogate compound for QC check.

PAGE 2 HOWARD LABS INC REPORT LAB # 87-12-076
RECEIVED: 12/01/87
Results by Sample

SAMPLE ID #12-1-87-1 FRACTION 01A TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 12/01/87 Category

DATA FILE B1250
DATE INJECTED 12/02/87 ANALYST CMH VERIFIED BY CMH

COMPOUND	RESULT	UNITS
1,1-Dichloroethene	101.0	ug/L
Methylene Chloride	125.0	ug/L
1,1-Dichloroethane	2,060.0	ug/L
1,1,1-Trichloroethane	6,700.0	ug/L
1,2-Dichloroethane	550.0	ug/L
Trichloroethene	169.0	ug/L
Tetrachloroethene	189.0	ug/L
No other compounds detected.		

Second sample FROM Post Hole IN COMKeb

More Decimal 3 To Left FOR PPM

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	92.4 %	S1V
toluene-d6	87.5 %	S2V
bromofluorobenzene	89.8 %	S3V

CODE SV - Surrogate compound for QC check.

J. Jon 12-10-87

EXHIBIT #7C

PAGE 1 HOWARD LABS INC REPORT LAB # 88-03-D42

RECEIVED: 03/24/88 04/30/88 17:30:14

CLIENT CHRYSLER SAMPLES 1
COMPANY Chrysler Corporation
FACILITY Power Train Division

REPORT Chrysler Corporation (5407)
TO 1600 Webster Street
Dayton, Ohio 45404

ATTEN John Lion

WORK ID Sample #03-24-88-01
TAKEN Not Indicated
TRANS Delivered
TYPE Aqueous
P.O. # A-874306188-A Supplier 36273
INVOICE under separate cover

PREPARED BY HOWARD LABORATORIES, INC.
3601 South Dixie Drive
P.O. Box 369
Dayton, OH 45449
PHONE 513-294-6856

CERTIFIED BY

CONTACT J ANDREJCIO

Enclosed are the results of specified samples submitted for analyses. If you have any questions, please advise. Use the "LAB #" for faster identification.
OHIO EPA CERTIFICATION: CHEMICAL 4074 BACTERIOLOGICAL 857

SAMPLE IDENTIFICATION
Q1 #03-24-88-01

HOWARD LABS INC TEST CODES and NAMES used on this report
VOAMSC QC/MS SCAN TOTAL VOLATILES

Material in Hole in Floor by stairway 9225

Road 5-988

RECEIVED: 03/24/88

Results by Sample

SAMPLE ID #03-24-88-01 FRACTION 01A TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected not specified Category

DATA FILE 27125 VERIFIED BY DLH

DATE INJECTED 04/06/88 ANALYST CMH

COMPOUND	RESULT	UNITS
1,1-Dichloroethene	4.5	mg/Kg
1,1-Dichloroethane	90.0	mg/Kg
Cis-1,2-Dichloroethene	21.4	mg/Kg
1,1,1-Trichloroethene	279.0	mg/Kg
Trichloroethene	13.3	mg/Kg
Tetrachloroethene	24.8	mg/Kg
Ethyl benzene	178.0	mg/Kg
Xylenes	88.0	mg/Kg
Method detection limit < 1.5 mg/Kg.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	82.2 %	S1V
toluene-d6	83.3 %	S2V
bromofluorobenzene	91.1 %	S3V

CODE SV - Surrogate compound for GC check.

PAGE 1 HOWARD LABS INC REPORT LAB # 89-04-419

RECEIVED: 04/10/89 05/05/89 20:45:04

CLIENT CHRYSLER SAMPLES 2
COMPANY Chrysler Corporation
FACILITY Power Train Division

REPORT Chrysler Corporation (5407)
TO 1600 Webster Street
Dayton, Ohio 45404

ATTEN John Lion

WORK ID #04-10-89-01 Building 40B
TAKEN 4/10/89
TRANS Delivered
TYPE Aqueous
P O. # A-874306188-B Supplier 36273
INVOICE under separate cover

PREPARED HOWARD LABORATORIES, INC.
BY 3601 South Dixie Drive
P.O. Box 369
Dayton, OH 45449
PHONE 513-294-6856 FAX # 294-7816

Jackie D. Webster
CERTIFIED BY

CONTACT J ANDREJCIO

Results of samples submitted for analysis are enclosed. When inquiring, please reference "LAB #". Samples will be discarded 30 days following report unless advised otherwise.
OHIO EPA CERTIFICATION: CHEMICAL 4074 BACTERIOLOGICAL 857

SAMPLE IDENTIFICATION	
01	#04-10-89-01
02	Blanks

HOWARD LABS INC TEST CODES and NAMES used on this report

VOAMSC GC/MS SCAN TOTAL VOLATILES

From Hole in Concrete by stairway.
J. Fron.

RECEIVED: 04/10/89

Results by Sample

SAMPLE ID #04-10-89-01 FRACTION 01A TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 04/10/89 Category

DATA FILE B9568B9602

DATE INJECTED 04/23/89 ANALYST KH

VERIFIED BY KGM

COMPOUND	RESULT	UNITS	
Chloroethene	25.5	ug/L	
Chloroethane	3,430.0	ug/L	3.43 ppm
1,1-Dichloroethene	19.9	ug/L	
1,1-Dichloroethane	1,360.0	ug/L	1.36 ppm
cis-1,2-Dichloroethene	1,230.0	ug/L	1.23 ppm
1,1,1-Trichloroethane	41.2	ug/L	0.041 ppm
Trichloroethene	73.3	ug/L	
Tetrachloroethene	7.8	ug/L	
Acetone	3,970.0	ug/L	3.97 ppm
MEK	337.0	ug/L	0.337 ppm
Method Detection Limit	< 2.5	ug/L	

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	107.0 %	S1V
toluene-d6	95.4 %	S2V
bromofluorobenzene	98.0 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 89-04-419

RECEIVED: 04/10/89

Results by Sample

SAMPLE ID Blanks FRACTION 02A TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected not specified Category

DATA FILE B9588 VERIFIED BY KGM

DATE INJECTED 04/24/89 ANALYST KH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 0.5 ug/L.		

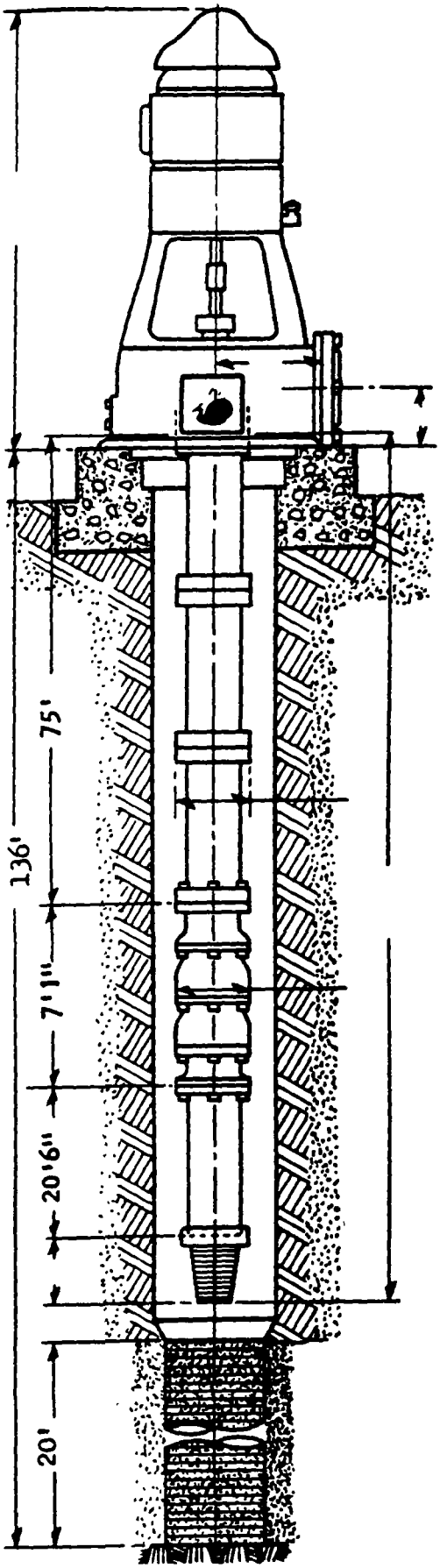
The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	92.6 %	S1V
toluene-d6	102.0 %	S2V
bromofluorobenzene	103.0 %	S3V

CODE SV - Surrogate compound for QC check.

EXHIBIT #8

MOODY'S OF DAYTON, INC.
VANDALIA, OHIO



TURBINE PUMP INSTALLATION FOR:
Chrysler Dayton Plant 1

WELL DESIGNATION NO. 3 - BLDG-52

DEMING

T16586	SERIAL NUMBER
1000	GALLONS PER MINUTE
237	TOTAL HEAD IN FEET
12"	6 STAGES
1750	MOTOR SPEED
* 75	FEET OF SETTING
8"	SIZE COLUMN
No	OIL TUBE
1½"	LINE SHAFT
20'6"	8" SUCTION PIPE
75	H.P. 460 VOLT. 60 CURRENT
water	LUBRICATION
100	FEET OF AIRLINE
1-27-76	DATE INSTALLED

18"	I.D. OF WELL
136	FEET DEEP FROM FOUNDATION
	FEET DEEP FROM GRADE
	STRAINER LENGTH — SLOT
11'4"	STATIC LEVEL — DATE 1-27-76
	" " — "
	" " — "
	" " — "
	DATE DRILLED

PUMP REPAIRED — DATE 1-27-76
" " — " 7-31-70
" " — " 8-17-64

WELL ACID TREATED — DATE 1-27-76
" " " — " 7-31-70

COMMENTS —

Weather conditions did not permit a capacity test - Well was pumped off through a man hole.

RECEIVED
MAR 16 1976
T. Sturr
Dept 3450

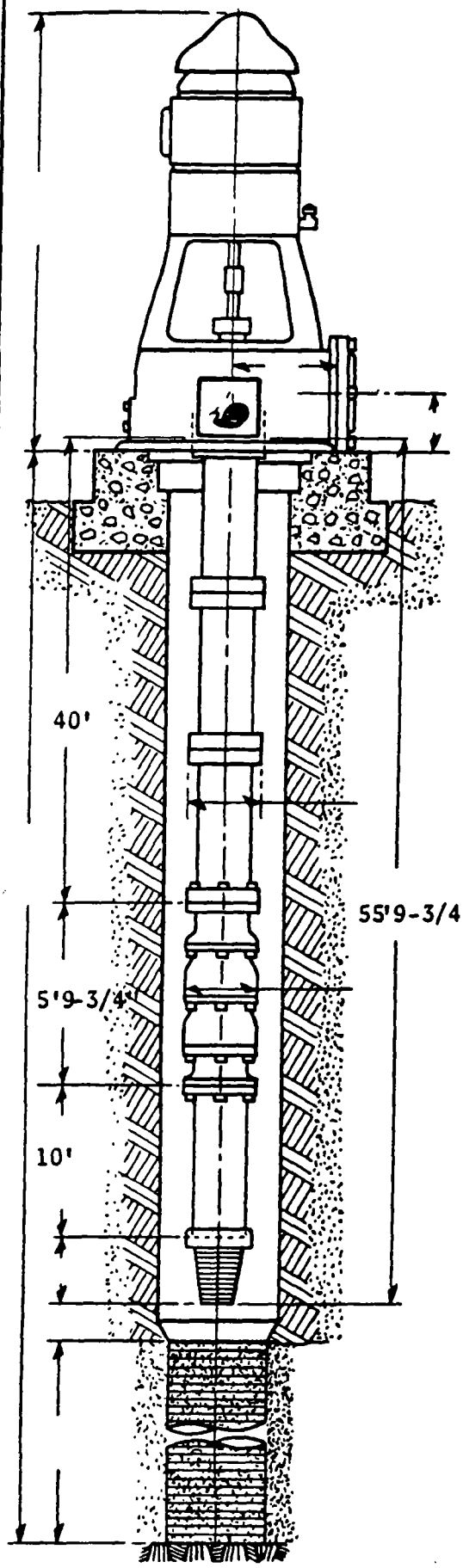
FORM TPI-762

LITHO IN U.S.A.

... consists of (1) section @ top, 5' long, plus (7) additional sections, each 10' long. This column pipe is standard 8" with three sleeve couplin

MOODY'S OF DAYTON, INC.

P.O. BOX 123, MIAMISBURG, OH.



TURBINE PUMP INSTALLATION FOR:

CHRYSLER CORPORATION - BOILER HOUSE

WELL DESIGNATION NO. 39

_____	SERIAL NUMBER
750	GALLONS PER MINUTE
225	TOTAL HEAD IN FEET
10" — 5	STAGES
1770	MOTOR SPEED
55'9-3/4"	FEET OF SETTING
8	SIZE COLUMN
0	OIL TUBE
40'	LINE SHAFT
10'	SUCTION PIPE
--	H.P. _____ VOLT. _____ CURRENT _____
water	LUBRICATION
55'	FEET OF AIRLINE
9/28/83	DATE INSTALLED

12"	I.D. OF WELL
79'	FEET DEEP FROM FOUNDATION
89'	FEET DEEP FROM GRADE
20'	STRAINER LENGTH — SLOT _____
30'	STATIC LEVEL — DATE 9/29/83
_____	" " — " _____
_____	" " — " _____
_____	" " — " _____
1963	DATE DRILLED

PUMP REPAIRED — DATE 9/27/83

" " — " _____

" " — " _____

WELL ACID TREATED — DATE _____

" " " — " _____

COMMENTS —

Discharge 10' below grade

EXHIBIT #11

8587 PRINTED IN USA REV. 3-31

LOCATION C

DATE	P	B	F	S	DEPT
12-29-59	10				
	14	8	2	1-5	282

EQUIPMENT RECORD

EQUIPMENT NUMBER AIR - 5668

DISPOSITION Work

NAME OF ARTICLE Degreaser

Circo vapor Liquid vapor Liquid vapor straight through immersion steam heated Degreaser.
As per Proposal #99-877 including supplemental letter of Aug. 21, 1959.

Tilt device for fixtures to drain onto Storage Tank (3300 gal. cap.) overhead
(2) Blowers (exhaust) cat. 8 1/2 HP each
Still - Model OP-300-0, Ser. 2993-2
4' x 5' x 8' 6" H. Still cap. 300 GPH @ 30% contamination - steam heated
1/3 HP Heated Motor & Pump
1 HP Electro Dynamic Motor & Pump
AIR-1825, Pump & Motor Integral

CLASS 282

DATE OF ACQUISITION

COST

PURCHASE		
FREIGHT		
MATERIAL		
LABOR		
BURDEN		
TOTAL		

Pr-7300-59 Po-1613
Item 1 - AP-2825-J
APA-21289 RR-10062
Del. 10-22-59
Wgt. 60000#

MAKER'S NUMBER 2993-1

MODEL Special Monorail

SIZE 48"L x 17'H x 6'W

H P. CONSUMPTION 10 HP EST.

AIR 5547 MAKER Circo Equip. Co.

ADDRESS Clark (Rahway) New Jersey

BOUGHT OF Same

ADDRESS

MONTHLY CLOSING

C. W. O. 150055

PAGE

DATE

AUDIT DATES	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.

3587 PRINTED IN USA REV. 3-31

LOCATION C

DATE	P	B	F	S	DEPT.
12-63		40-			

MAKER'S NUMBER 2993-1

MODEL Special Monorail

SIZE 48'L x 17'H x 6'W

H P. CONSUMPTION 12 HP est.

EQUIPMENT RECORD

NAME OF ARTICLE [redacted]

Steam Vapor Liquid Vapor Liquid Vapor straight through immersion steam heated degreaser. Will devise for fixtures to drain. Cable (1) 250 GPH Still & 136' of 4" overhead conveyor (1 rect. loop 60' L x 18'W), driven by 1/2 HP motor & 750 reducer (for aluminum parts only) and divided by a partition through center lengthwise to convert from single purpose to dual purpose.

P-7300-96 (2148) Item 8 Mfr.-Stein & Hungo, PO-AE-87119-K & AE-87071-K.

Demobilization of AIR-2668

MAKER

ADDRESS

BOUGHT OF

ADDRESS

EQUIPMENT NUMBER [redacted]

DISPOSITION 604

CLASS 361B [redacted]

DATE OF ACQUISITION 1-1963

COST

PURCHASE	20,710	35
FREIGHT		
MATERIAL	24	43
LABOR	1,547	38
BURDEN	495	17
TOTAL	22,777	00

MONTHLY CLOSING

C. W. O. 150084

PAGE

DATE

AUDIT DATES	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.

84-110-3587

Acct. 361B0001

EQUIPMENT RECORD

EQUIPMENT NUMBER [redacted] 104186

LOCATION DATE	P	B	F	S	DEPT
1/66	73 02	40 B	1	1 5	9221

NAME OF ARTICLE DEGREASER

DISPOSITION 404

CLASS 212

DATE OF ACQUISITION 1966

To revise alum. coil degreaser

Conveyor approx. 16' and adding approx. 328' of new conveyor. Totaling approx. 470' for the aluminum coil degreaser.
Conveyor AFA-1722 - AT-28724-M
F7300-3579 (3187-D) Item 40
* Caterpillar drive R.H. Cap. 1000# Vari-Speed w/OOVBS Floating - Pulley. Speed 6-15, 1 HP Motor - 1740 RPM
AFA-1687 - AT-29650-M
F3187-D Item 39 RR 40449 dtd (12-27-65)
Jarvis B. Webb Company

COST

PURCHASE		
FREIGHT		
MATERIAL		
LABOR		
BURDEN		
TOTAL		

MAKER'S NUMBER 2993-1

MODEL Special Monorail

SIZE Appx. 470'

H P CONSUMPTION 1 1/2 HP

MAKER

ADDRESS Custom Welding Shop

BOUGHT OF Dayton, Ohio

ADDRESS

MONTHLY CLOSING 150917

C. W. O.

PAGE

DATE

AUDIT DATES	JAN.	FEB.	MAR	APR	MAY	JUNE	JULY	AUG	SEPT.	OCT	NOV.	DEC.

EXHIBIT #12

O'BRIEN & GERE

December 8, 1987

OVERNIGHT DELIVERY

Mr. George Higgs
CIMS 482-05-00
Chrysler Motors Corporation
1600 Webster Street
Dayton, OH 45401

Re: Building 40B

File: 3040.064 #2

Dear Mr. Higgs:

Enclosed for your review and use is our summary report regarding the observed contamination below the floor of your manufacturing building No. 40B. The report documents the information collected by our hydrogeologist and briefly outlines a work plan for further investigation into the source of the problem and possible impacts.

However, as we discussed, Chrysler may at this time decide to limit activities to the immediate vicinity of the observed contamination. By removing collected liquid from the excavated hole, it might be possible to contain the contamination within a highly localized area. The overall extent and impact of the problem, however, will remain unknown.

It is our understanding that Chrysler corporate legal staff will render an opinion regarding the need to report to the Ohio Environmental Protection Agency. If you have any questions or comments, please call me or Deborah Wright of our office.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

James R. Heckathorne, P.E.
Managing Engineer

JRH/meh:41:9

cc: Mr. Donald J. Remboski - Chrysler Motors
Ms. Deborah Y. Wright - O'Brien & Gere

O Brien & Gere Engineers Inc
Box 4873 / 1304 Buckley Road / Syracuse NY 13221 / (315) 451-4700
Blue Bell PA / Boston, MA / Edison, NJ / Johnson City, NY / Landover, MD / New York, NY / St Louis MO

MEMO: To Files
FROM: D.Y. Wright
RE: Site Inspection
Chrysler Dayton Plant
FILE: 3040.064
DATE: December 7, 1987

CC: J.T. Mickam
G.A. Swenson
J.R. Heckathorne

On Monday, November 30, 1987 and Tuesday, December 1, 1987 I visited the Chrysler Plant in Dayton, Ohio for the purpose of developing a work plan to investigate the source of the Waste Oil and 1,1,1 - TCA found beneath the floor in an area located in Building 40b. I met with George Higgs, the engineer in charge of operations. Also present was Vern Allen who is in charge of the waste disposal. We discussed the situation in general and then inspected the area. The results of the discussion and inspection follows.

Apparently while a contractor was installing some guard posts within the plant a hole was cut in the concrete flooring. During the cutting procedure, oil and water was observed oozing out of the cuts. Beneath the concrete was a 6 inch layer of till which covered a thick reinforced concrete slab apparently used at one time for the base of a large press. The size of this slab is presently unknown. Oil/water was observed flowing into the hole through the fill material predominantly from the northern side. Work was then discontinued, and a sample of the oil and water was collected and sent to a local laboratory for analysis. The results of the analyses are attached. In general, the oil contained mixed alkanes at a concentration of 42,700 mg/kg. The water layer contained 10,900 ug/l of 1,1,1-trichloroethane, 288 ug/l methyl ethyl ketone and a number of other chlorinated organics. The oil and water in the hole was then removed and placed in a waste oil area for later disposal. The following day the hole was filled to just below the base of the concrete floor with the water and approximately 1 inch of oil. This was the condition which I observed on November 30, 1987.

During the inspection, the plant layout was discussed. It appears that the plant was originally constructed in the 1920's. Additions and modifications have been completed [redacted] the years and are still being completed from time to time. Some of the old [redacted]structures encountered during some of the work included reinforced concrete p[redacted] and concrete pits which used to hold hydraulic oil for some of the machinery. [redacted]veral areas in the vicinity of the new hole have been excavated recently for the purpose of installing a new drainage system. No water or oil was found in any of these areas.

Some of the structures known to have existed in the area of the discovery include a degreasing station located 50 feet south which was an above-grade facility and a subgrade waste oil sump located 20 feet southwest which was constructed of concrete and recently filled in.

Information obtained during the site inspection included the following:

- Lab results of the analyses completed on the samples collected of the water/oil (attached).

- Records of the three supply wells located on the property - information is limited. These wells were installed by either Layne Ohio or GM Baker & Son (data is attached).

- A facility map (copy attached).

- Name of the Engineering firm who was in charge of most of the construction work at the facility - Albert Kahn from Detroit Michigan (Job #1970-C). They may be able to provide information regarding some of the older structures in the facility as no such records can be found at the plant.

- Bibliography of hydrogeologic reports pertaining to the area - Obtained from Wright State (attached).

Based on information obtained during the site visit, it is suspected that the water/oil found in the new hole may be a localized occurrence and may have originated from a nearby subgrade pit of unknown location. This premise is supported by the following observations which have been made:

1) The point of discovery is underlain by a concrete slab which may serve as a barrier to vertical migration.

2) Other excavation in the vicinity have not encountered liquids.

Whether or not these liquids have impacted the ground water system has not been determined. Based on discussions with George Higgs and Bill Drees, it is the desire of Chrysler to find and remove the source of the liquids.

On Tuesday we briefly discussed an approach which could be taken to investigate the problem. I outlined a basic approach which I felt would address the problem as follows:

I. Background Information Review

- [redacted] and review old plant maps
- Interview older employees to determine if pit areas are present
- Obtain and review information pertaining to the local hydrogeology - particularly the local aquifers and nearby ground water users in the area.

II. Source Investigation - to identify extent and location of source of water/oil pool

- Complete additional holes or trenches in area.
- Analysis of soils as necessary.

III. Ground Water Investigation - to determine whether the ground water has been impacted by the water/oil

- 3 monitoring wells outside building - North, South and East of area.
- 1 monitoring well if possible inside of building west of the area.
- Sampling and analysis of monitoring wells and three existing supply wells.

IV. Letter Report

- Determination of whether impacts to ground water has occurred.

The primary task at this point would be to determine the source and extent of the pool of water/oil. We discussed sampling the three supply wells on the property, but they indicated that the wells were only used to supply cooling water to the plant and did not feel it was necessary to have analyses completed. Additionally, we discussed installing ground water monitoring wells just the outside of the building. Since the problem at hand appears to be localized, Bill and George felt that the only effort necessary to be completed at this time would be to determine the extent and source of the water/oil found in the hole.

Because the reported findings and observations suggest that the problem may be localized, a logical first step might be to pump the contents of the excavated hole to drums for disposal as waste. Further observations of the rate and volume of recharge, if any, may indicate that the immediate problem can be controlled in this manner. At that point, Chrysler could make a decision regarding the need to complete the investigations outlined above.

DYW:emr/26.4
Attachments

HOWARD LABS INC REPORT LAB # 87-11-A27

ECEIVED: 11/23/87

Results by Sample

AMPLE ID #11-23-87-2 FRACTION 02A TEST CODE GCMS NAME GCMS Scan

Date & Time Collected 11/23/87 Category

DATA FILE E0356

DATE INJECTED 11/24/87 ANALYST WMC

VERIFIED BY DLH

oil

COMPOUND	RESULT	UNITS
Mixed alkanes	42,700.0	ug/Kg
No other compounds detected with a detection limit of 44.0 ug/Kg.		
NOTE: This sample was taken from the oil layer.		

Hole IN CONCRete

The following are inter-laboratory QA/QC results for EPA Method 625/1625.

COMPOUND	RESULT	CODE
nitrobenzene-d5	68.8 %	S1B
2-fluorobiphenyl	77.2 %	S2B
terphenyl-d14	71.5 %	S3B
phenol-d5	92.6 %	S1A
2-fluorophenol	101.0 %	S2A
2,4,6-tribromophenol	96.8 %	S3A

CODES - Surrogate compounds for QC check.

RECEIVED: 11/23/87 Results by Sample

SAMPLE ID #11-23-87-2 FRACTION 02A TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 11/23/87 Category

DATA FILE B1086 VERIFIED BY DLH
DATE INJECTED 11/24/87 ANALYST CMH

Hole IN CONCRETE

COMPOUND	RESULT	UNITS
1,1-Dichloroethene	135.0	ug/L
1,1-Dichloroethane	2,800.0	ug/L
1,1,1-Trichloroethane	10,900.0	ug/L
Trichloroethene	308.0	ug/L
1,1,2-Trichloroethane	43.8	ug/L
Tetrachloroethene	286.0	ug/L
1,2-Dichlorobenzene	14.3	ug/L
Cis-1,2-dichloroethene	2,470.0	ug/L
Methyl Ethyl Ketone	288.0	ug/L
No other volatile compounds		
detected with a detection		
level of < 12.5 ug/L.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	69.0 %	S1V
toluene-d6	91.4 %	S2V
bromofluorobenzene	120.0 %	S3V

CODE SV - Surrogate compound for QC check.

CITY OF DAYTON

CHRYSLER AIRTEMP SALES CORP. 10,11,12

9-185
(October 1950)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

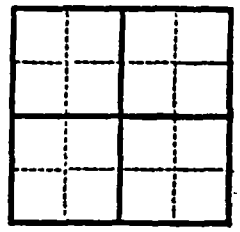
WELL SCHEDULE

Date 3-14-55, 19____ Field No. _____

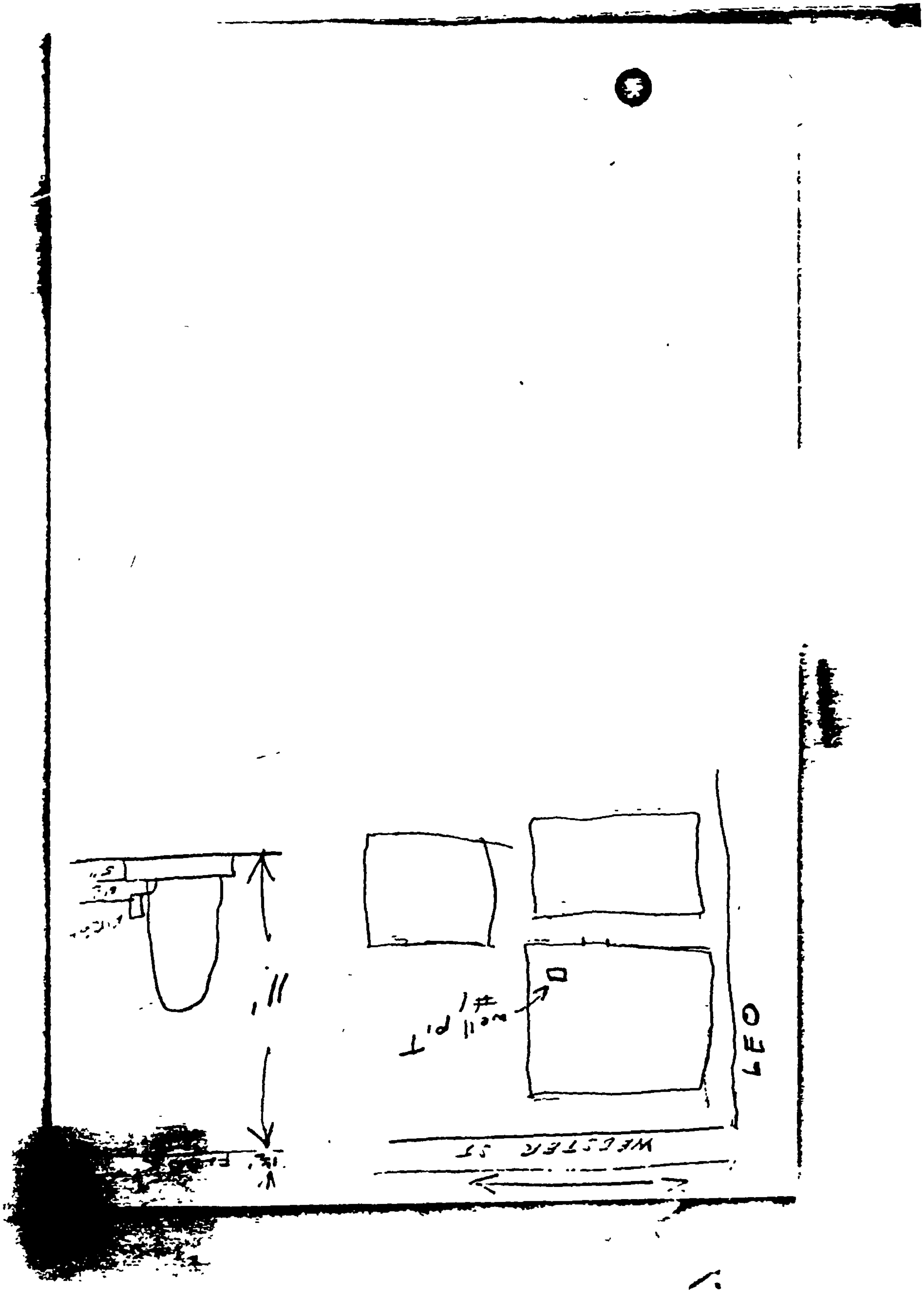
Record by KER Office No. 10

Source of data Mr. [illegible]

1. *Location:* State OHIO County MONT.
   Map [illegible]
   ____ ¼ ____ ¼ sec. ____ T ____ N/S R ____ E/W
2. *Owner:* AIRTEMP Address [illegible]
   Tenant _____ Address _____
   Driller [illegible] Address _____
3. *Topography* [illegible]
4. *Elevation* 750 ft. above / below
5. *Type:* Dug, drilled, driven, bored, jetted ____ 1938
6. *Depth:* Rept. 20 ft. Meas. _____ ft.
7. *Casing:* Diam. 10 in., to _____ in., Type _____
   Depth _____ ft., Finish [illegible]
8. *Chief Aquifer* _____ From _____ ft. to _____ ft.
   Others _____
9. *Water level* 12 ft. rept. / meas. AIRLINE 3-14 1955 above / below [illegible]
   _____ which is 11 ft. above / below surface
10. *Pump:* Type [illegible] Capacity 500 G. M. _____
    Power: Kind [illegible] Horsepower 30
11. *Yield:* Flow _____ G. M., Pump [illegible] G. M., Meas., Rept. Est. _____
    Drawdown 11 ft. after _____ hours pumping _____ G. M.
12. *Use:* Dom., Stock, PS., RR., Ind., Irr., Obs. _____
    Adequacy, permanence _____
13. *Quality* [illegible] Temp _____ °F.
    Taste, odor, color _____ Sample Yes / No _____
    Unfit for _____
    Remarks: (Log, Analyses, etc.) [illegible]



U. S. GOVERNMENT PRINTING OFFICE 16—62881-1


11'
well PIT #1
LEO

9-185
(October 1950)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WELL SCHEDULE

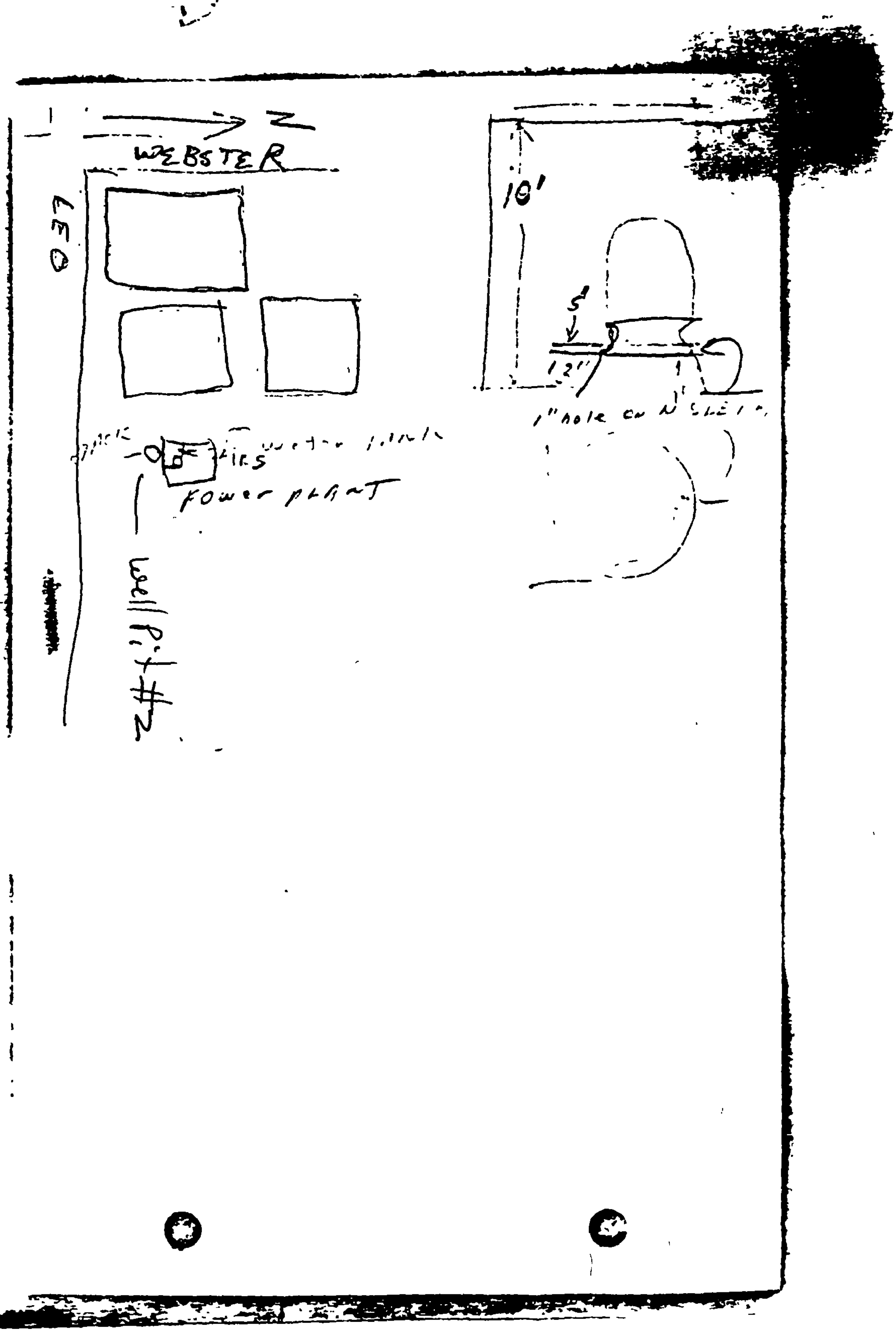
Date ... 55 ..., 19...... Field No. ......

Record by ...... ~~Office No.~~ 11

Source of data ......

1. *Location:* State ...... County ......
   Map ...... N E ......
   ...... ¼ ...... ¼ sec. ...... T ...... N/S R ...... E/W
2. *Owner:* AIRTEMP Address ......
   Tenant ...... Address ......
   Driller ...... Address ......
3. *Topography* ......
4. *Elevation* 752 ft. above/below ......
5. *Type:* Dug, drilled, driven, bored, jetted ...... 19......
6. *Depth:* Rept. ...... ft. Meas. ...... ft.
7. *Casing:* Diam. ...... in., to ...... in., Type ......
   Depth ...... ft., Finish ......
8. *Chief Aquifer* ...... From ...... ft. to ...... ft.
   Others 10' ...... static 1/8/58
9. *Water level* ...... ft. rept./meas. ...... 19...... above/below ......
   ...... which is ...... ft. above/below surface
10. *Pump:* Type ...... Capacity ...... G. M. ......
    Power: Kind ...... Horsepower ......
11. *Yield:* Flow ...... G. M., Pump 200 ...... G. M., Meas., Rept. Est. ......
    Drawdown ...... ft. after ...... hours pumping ...... G. M.
12. *Use:* Dom., Stock, PS., RR., Ind., Irr., Obs. ......
    Adequacy, permanence ......
13. *Quality* ...... Temp ...... °F.
    Taste, odor, color ...... Sample Yes/No ......
    Unfit for ......
14. Remarks: (Log, Analyses, etc.) ......
    ......
    PRESSURE TANK

U. S. GOVERNMENT PRINTING OFFICE 16—12881-1


N
WEBSTER
LEO
10'
5'
12"
1" hole on N
Power plant
Well Pit #2

9-185
(October 1950)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Suspected to be Plant Well #3

WELL SCHEDULE

Date 2-14-55, 19..... Field No. new

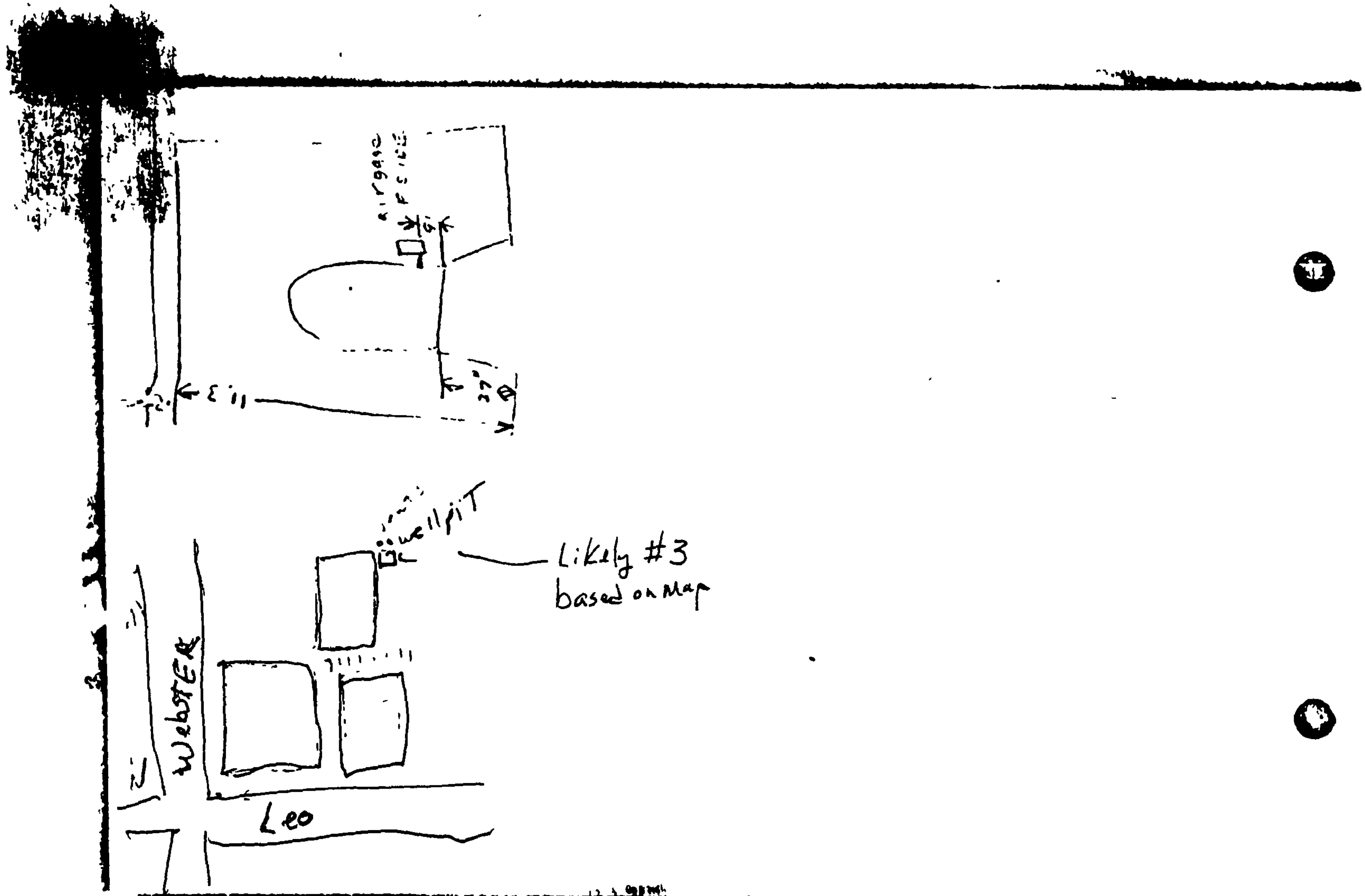
Record by ..... ~~Office No.~~ 12

Source of data .....

1. *Location:* State ..... County .....
   Map .....
   ..... ¼ ..... ¼ sec. ..... T ..... N S R ..... E W
2. *Owner:* AIRTEMP Address .....
   Tenant ..... Address .....
   Driller ..... Address .....
3. *Topography* .....
4. *Elevation* 750 ft. above / below .....
5. *Type:* Dug, drilled, driven, bored, jetted 1953
6. *Depth:* Rept. 137 ft. Meas. ..... ft.
7. *Casing:* Diam. 12 in., to ..... in., Type .....
   Depth ..... ft., Finish .....
8. *Chief Aquifer* ..... From ..... ft. to ..... ft.
   Others .....
9. *Water level* 9 ft. rept. / meas. 1 1 8 1953 above / below .....
   ..... which is 7 ft. above / below surface
10. *Pump:* Type ..... Capacity ..... G. M. .....
    Power: Kind ..... Horsepower 175
11. *Yield:* Flow ..... G. M., Pump 1 ... G. M., Meas., Rept. Est. .....
    Drawdown ..... ft. after ..... hours pumping ..... G. M.
12. *Use:* Dom., Stock, PS., RR., Ind., Irr., Obs. .....
    Adequacy, permanence .....
13. *Quality* ..... Temp ..... °F.
    Taste, odor, color ..... Sample Yes / No .....
    Unfit for .....
14. *Remarks:* (Log, Analyses, etc.) .....

about

U. S. GOVERNMENT PRINTING OFFICE 16—62891-1



wellpit
Likely #3
based on Map
WebSTER
Leo

9-185
(October 1950)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

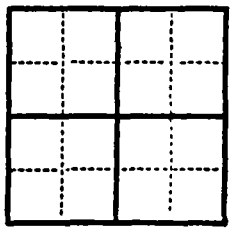
WELL SCHEDULE

Date 6, 19 5? Field No. _____

Record by _____ Office No. 92894

Source of data See Mr. Thomas

1. *Location:* State _____ County Mont
   Map Mad River Twp - Sec 5
   ____ ¼ ____ ¼ sec. ____ T ____ N S R ____ E W
2. *Owner:* Chrysler Corp Address 1600 Webster
   Tenant _____ Address _____
   Driller Don Roe Address _____
3. *Topography* _____
4. *Elevation* 750 ± ft. above below _____
5. *Type:* Dug, drilled, driven, bored, jetted 4 19 54
6. *Depth:* Rept. 136 ft. Meas. _____ ft.
7. *Casing:* Diam. 16 in., to _____ in., Type _____
   Depth 116 ft., Finish _____
8. *Chief Aquifer* _____ From _____ ft. to _____ ft.
   Others 20' Screen
9. *Water level* 20 ft. rept. meas. 4 19 54 above below _____
   _____ which is _____ ft. above below surface
10. *Pump:* Type — Capacity _____ G. M. _____
    Power: Kind _____ Horsepower _____
11. *Yield:* Flow _____ G. M., Pump 1000 G. M., Meas., Rept. Est. _____
    Drawdown 18 ft. after 10 hours pumping _____ G. M.
12. *Use:* Dom., Stock, PS., RR., Ind., Irr., Obs. _____
    Adequacy, permanence _____
13. *Quality* _____ Temp _____ °F.
    Taste, odor, color _____ Sample Yes No _____
    Unfit for _____
    Remarks: (Log, Analyses, etc.) _____



U. S. GOVERNMENT PRINTING OFFICE 16—42881-1

suspected Well #3 @ Plant

~~Log~~ #12

Drty gr	0 - 28
crse gr	37
" "	50
Drty gr	57
Yell tell	55
blu tell	60
gr	65
crse s	70
s & gr	82
red & blu tell	84
Drty gr	85
blu tell	100
s & gr	128
blu tell	129
crse s	137
gr	136

X General Correspondence 1963

MOODY'S Since 1891

of Dayton, Inc.

SUCCESSOR TO THE DON-ROS CO.

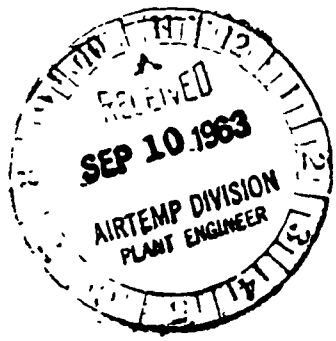
P. O. Box 155 • 150 N. Dixie Drive
Vandalia, Ohio • Phone 898-4514
Phone 898-4971

WELL #3
BLDG. #50

September 9, 1963

GROUND LEVEL ELEVATION - 751.25 @ MANHOLE COVER FOR WELL PIT.

Chrysler Airtemp
P. O. Box 1037
Dayton 1, Ohio



Subject: Bldg. #50 Well Deming Pump

Attention: Mr. E. R. Wray - Plant Engineer

Gentlemen:

We are pleased to submit our report concerning the orifice test conducted on your well located in building 50.

Static level 9' - measured from top pump foundation.

Capacity	Pumping Level	Drawdown	Specific Yield
321 GPM	23'	14'	23 GPM/ft. D. D.
454 GPM	27'	18'	25.2 GPM/ft. D. D.
557 GPM	31'	22'	25.3 GPM/ft. D. D.
643 GPM	34'	25'	25.7 GPM/ft. D. D.
718 GPM	36'	27'	26.6 GPM/ft. D. D.
787 GPM	38'	29'	27.1 GPM/ft. D. D.
844 GPM	40'	31'	27.1 GPM/ft. D. D.
903 GPM	41'	32'	28.2 GPM/ft. D. D.
958 GPM	42'	33'	29 GPM/ft. D. D.
1062 GPM	43'	34'	31.2 GPM/ft. D. D.

Recovery Rates:

[redacted] in 1 - minute

[redacted] in 2 - minutes

The pump is running smoothly and the well is producing at a reasonable specific yield. We do not recommend revitalizing or treating this well at this time. When the specific yield drops down to about 20 GPM/ft. D. D. this well should be chemically treated. If we can be of further assistance concerning this matter, please advise. We appreciate your business very much, and hope that we have performed to your complete satisfaction.

Very truly yours,

MOODY'S OF DAYTON, INC.

Edw. B. Wagner

Edward B. Wagner
General Manager

GROUND WATER SPECIALISTS

19?? - 19??

50 gpm x 60 x ? x 5 x 50 = 6 million per year

1939 - 1942

500 GPM x 60 x 4 x 5 x 50 = 60 million per year

1942 - 1946

500 GPM x 60 x 16 x 50 = 120 million per year

1947 - 158

48 - 169

49 - 180

50 - 193

51 - 204

52 - 215 ?

53 - 226 ?

54 - ~~237~~ 478

[redacted] FEEDWATER [redacted] PUMP

LOCATION	3/3 1955	#	TIME	CAPACITY 1000 GALLONS PER	
Bldg. #30	3/21	21	2120	1000	2120
Bldg. 40-A	3/28	49	4940	400	1980
Boiler House	4/4	99	9950	500	4990
					9090 M gall/wk

Avg. water pumped per week during test — 9080 M gallons

Less avg. makeup for Boiler House per week *during time period* — 181 M gallons

Water required per week for production — 8899 M gallons/wk

Water pumped for boiler house:

$\frac{3{,}130 \text{ lb steam/hr}}{8\ 1/3}$ x 30% makeup = *average for year* — 112 M gallons/wk

Water pumped for air conditioning:

$\frac{40 \text{ GPM} \times 10080 \text{ min/wk}}{1000}$ = 403 M gal/wk — 1,728,000 gal per month air c 5.4 month

Avg. per wk = 403 M gal x 45% cooling time/year = 182 M gallons/wk

Total / week = 9,193,000 gallons

Total / year = 479,036,000 gallons

AIR COMP REQUIRED FIGURES BASED ON TIME METER ON EACH PUMP FOR 1 WEEK PERIOD.

ESTIMATED [redacted] OF 2 OLD WELLS REDUCED TO 700 [redacted] GPM

468,572,000 gal/yr
9,331,200 "
477,903,200

9-275d
(Feb 1934)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES BRANCH

Date 3-14-[illegible], 19.... R.E.R.

MISCELLANEOUS FIELD NOTES

[illegible]

R20, T20N, Sec 1 Taylor H[illegible]
[illegible] in Sec 1 [illegible]

[illegible] 5 miles [illegible]
Sec Corn. Typha [illegible]
[illegible] 40 ac, [illegible]
[illegible] Typha [illegible]

2/2 mi E 1947 [illegible]
[illegible]

Dist [illegible] 17 [illegible]
[illegible] 14
T [illegible] [illegible]
protection [illegible]
[illegible] on [illegible]
estimated
[illegible]
[illegible]
[illegible] 1951 30% [illegible]

[illegible] of [illegible] sheets

16—48178-8 U. S. GOVERNMENT PRINTING OFFICE

[illegible] well cap ~~700~~ 500 GPM 24hr 360 days

[illegible] GPD or [illegible] GPY

[illegible] PLANT WELL cap ~~500~~ 400 GPM 16 hr 250 days

480,000 GPD or 120,000,000 GPY

New well cap 1000 GPM 4hr – 250 Day

240,000 GPD or 60,000,000 GPY

471 0[illegible]0

542,880,000 year

45,240,000 MON

1,508,000 DAY

Do not have log on well
suggested I contact well driller
[illegible] install time meter to [illegible] more
accurate information purposes
Mr [redacted] (CULTRERA) accompanied me on
well [redacted] which can only
be [redacted] after 3:30 PM.
[illegible] said [illegible] 2 of the
day, [illegible] 9 hr, [illegible]
[illegible] 4 hrs. Requested [illegible] another
well [illegible].

([illegible] HAVE LOG [illegible])

[illegible] 1926 – 90' 10" – Lee JACKSON

[illegible] 7 [illegible] – IRA CRANE

[illegible] – 1.7' [illegible] 230 [illegible]

[illegible] duplex surface pump [illegible]

REFERENCES

The Water Resources of Montgomery County Ohio, Stanley Norris, Ohio Water Resources Board Bulletin 12.

The Bedrock Surface and Former Drainage Systems of Montgomery Co., Ohio Journal of Science V49 No. 4.

Ground Water Resources of Dayton Area, Ohio USGS Water Supply Paper 1808.

Geologic Map of 1° x 2° Cincinnati

Ground Water for Planning in SW Ohio, Ohio Division of Water, Ohio Water Plan Inventory Report.

Records of Wells in Montgomery County: Ohio Water Resources Board Bull.

Well #3 Bldg. 50
Moodys of Dayton - New Pump
Layne Ohio Installed - L.T. Hunziker
1953 or 1954
Deep 1000 gpm
18" ID 136'

Well #2 Boiler House
Depth of Well 87'
12" Diameter
20' of Screen
SWC 9' BTOC
18' Bgrade
1945
GM Baker & Son
205E 1st Street
Columbus - Dayton
BA2-3292

Well #1 Proposed
Lieb-Jackson, Inc.
100' deep, 20' screen
1936

DRAFT

JANUARY 26, 1990

TO: R. W. JOHNSON

FROM: L. L. BLAIR

SUBJECT: FLUID ACCUMULATION IN POST HOLE AT DAYTON THERMAL

Slightly over two years ago on November 19, 1987, a post hole was dug in Bldg. 40B. The dimensions of the hole were 19" X 19" X 10". After the cement flooring was removed, another cement slab was found at the bottom rather than dirt. This cement was believed to be a part of a former heavy equipment foundation.

Shortly after, liquids began to seep in from under the cement floor and accumulate in the hole. Because of the unknown origin of the fluid, a sample was taken and sent out for analysis on 11-23-87. The test results indicated the liquid was mainly water with a small amount of organic matter. Specifically, the analysis showed the water contained 17 ppm of chlorinated solvents, mostly 1,1,1-trichloroethane, and 43 ppm of volatile organic compounds (VOCs), and were described as mixed alkanes. The surface was also partially covered with a thin film of oil, probably hydraulic fluid, but this was not analyzed.

A review of the building's former use suggested the source of the chlorinated solvents may have come from degreasing equipment formerly located there. This equipment was removed about ten years ago. All the piping for this degreasing operation including the storage tank was located above ground - none of the piping was underground. This operation was located about 100 feet or less from the post hole.

DRAFT

Over the past two years, a total of about 22 gallons of liquid have been removed from the hole which is normally covered by a steel plate. A large portion of the fluid was removed during the first month or so. In addition and during that period, five separate analyses have also been performed on the water. The last analysis on 9-27-89 indicated only 0.3 ppm of chlorinated solvents. No VOCs were present. The surface of the water layer, however, was still partially covered with a thin film of oil. Overall, there has been a steady decline in both the rate of water accumulation and comtaminant levels in the water.

Again and whereas the first test measured 17 ppm of chlorinated solvents, the last test was greatly reduced and measured only 0.3 ppm. Based on information supplied by the plant along with the analytical data, calculations indicate an average of 7 ppm of chlorinated solvents in the 22 gallons of fluid collected over the past two years. From this, it is calculated that a total quantity of 0.6 milliliters of chlorinated solvents has been found. The VOCs - 43 ppm - were only found in the first test sample taken on 11-23-87. No VOCs were detected in any of the succeeding tests.

Before concluding this memo, an incident recently occurred at the plant that should be mentioned. In November 1989, the Ohio EPA made an unannounced visit to the plant for the purpose of conducting a RCRA inspection. As part of their effort, they requested permission to take water samples from the plant's two wells. The plant's primary source of well water comes from a deep well - 136 feet - located in Bldg. 50.

The results of the State's analysis showed there were no problems with heavy metals or VOCs. The results from a shallower backup well - 79 feet - in the powerhouse showed no heavy metals but did, however, detect chlorinated solvents at a concentration of about 2 ppm. These results were substantiated by separate and independent tests conducted by the plant.

DRAFT

A second later sample was taken by the State but the analysis has not been completed. In discussions with the State, they are concerned about the findings but indicated this is not an uncommon situation because chlorinated solvents have also been found in other industrial wells in the Dayton area.

At this time, there is no information to directly connect the two situations. Because of the distance between the powerhouse well and the post hole - about 600 feet - as well as the extremely small quantity of trichloroethane found - less that one milliliter - in the post hole, I believe the two incidents should be treated as separate and unrelated.

Based on a review of the above information and with the concurrence of the Office of the General Counsel, the plant should continue to remove on a regular basis any fluid still accumulating in the post hole until it stops. When this occurs, the hole should be recemented. In addition, the plant may want to consider the periodic monitoring of the powerhouse well water, which is used for cooling powerhouse equipment, for changes in contaminant levels which might adversely effect the equipment.

ACUSTAR

WORLD HEADQUARTERS

TELECOPIER COVER SHEET

DATE: JAN 29, 1990

TO: NEIL MC KAY **FAX NO:** 8-[illegible] 28

FROM: LOU BLAIR **PHONE:** 8-841-6711

COMMENTS: ENCLOSED IS A DRAFT OF PROPOSED POSITION BEFORE MEETING. I HAVE ALSO SOLICITED COMMENTS FROM LYNN BUHL & PLANT.

TOTAL NUMBER OF PAGES (INCLUDING COVER): 4

WORKING  TOGETHER

DRAFT

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DRAFT

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ACUSTAR

Inter Company Correspondence

Telephone	Date
841-6711	February 1, 1990

To--Name & Department			CIMS Number
.. H. Drees	Manufacturing Engineering	Dayton	478-05-00
From--Name & Department			**CIMS Number**
L. L. Blair	Manager - Environmental Planning	Acustar	404-02-01

Subject: **POST HOLE WATER ACCUMULATION AT DAYTON THERMAL**

On 11/19/87, the plant dug a routine post hole in Bldg. 40B. The dimensions of the hole were 19" x 19" x 10". Shortly after, water began to seep in from under the cement floor and accumulate in the hole.

Because the content of the water was unknown, plant personnel decided to have it analyzed and a sample was taken on 11/23/87. The test results indicated the water contained trace amounts of organic materials - 17 ppm of chlorinated hydrocarbons, mostly 1,1,1-trichloroethane and 43 ppm of other Volatile Organic Compounds (VOCs), which were described as mixed alkanes. The surface of the water was partially covered with a thin film of oil, probably hydraulic fluid, but was not analyzed.

A review of the building's prior use suggested the source of the chlorinated hydrocarbons, the material of greater interest, may have come from a degreasing operation formerly located there. The 1,1,1-trichloroethane was the degreasing solvent used. The operation was shut down and the equipment was removed about 10-12 years ago. A review was made with plant personnel which indicated all the equipment, piping and storage tank were located above ground - none of the system was underground. This equipment was located a short distance from the post hole.

Since the hole was originally dug, a total of about 22 gallons of water has been removed. Throughout that time period, there has been a steady decline in both the rate of water accumulation and concentration of foreign matter (see chart).

Whereas the first sample contained 17 ppm of chlorinated hydrocarbons and 42 ppm of VOCs, the last sample contained only 0.6 ppm of chlorinated hydrocarbons and no VOCs. Since the VOCs appear to be gone, only the chlorinated

POST HOLE WATER ACCUMULATION AT DAYTON THERMAL

hydrocarbons will be addressed. Based on the data collected, there has been an average of 7 ppm. From this, it is calculated that a total volume of 0.6 milliliters - about 12 drops - of chlorinated hydrocarbons has been collected in the water to date.

In an effort to conclude this matter, the following recommendations are made:

1. Start a program to completely remove all of the water from the post hole every week.

2. Combine the weekly fluids, for each month, in a container. Monitor the total volume and take a representative sample for analysis.

3. Analyze the sample for Volatile Organics. I believe this is EPA Method 8240, but check to confirm.

4. When the hole finally dries up, re-cement the hole.

I believe we have an obligation to monitor the fluid accumulating in the post hole and analyze its contents until the hole dries up. A steel plate now covers the hole. It has edges which extend above the opening and is a potential tripping hazard. Removing this steel plate and re-cementing the hole flush with the rest of the floor will eliminate a safety problem.

L. L. Blair

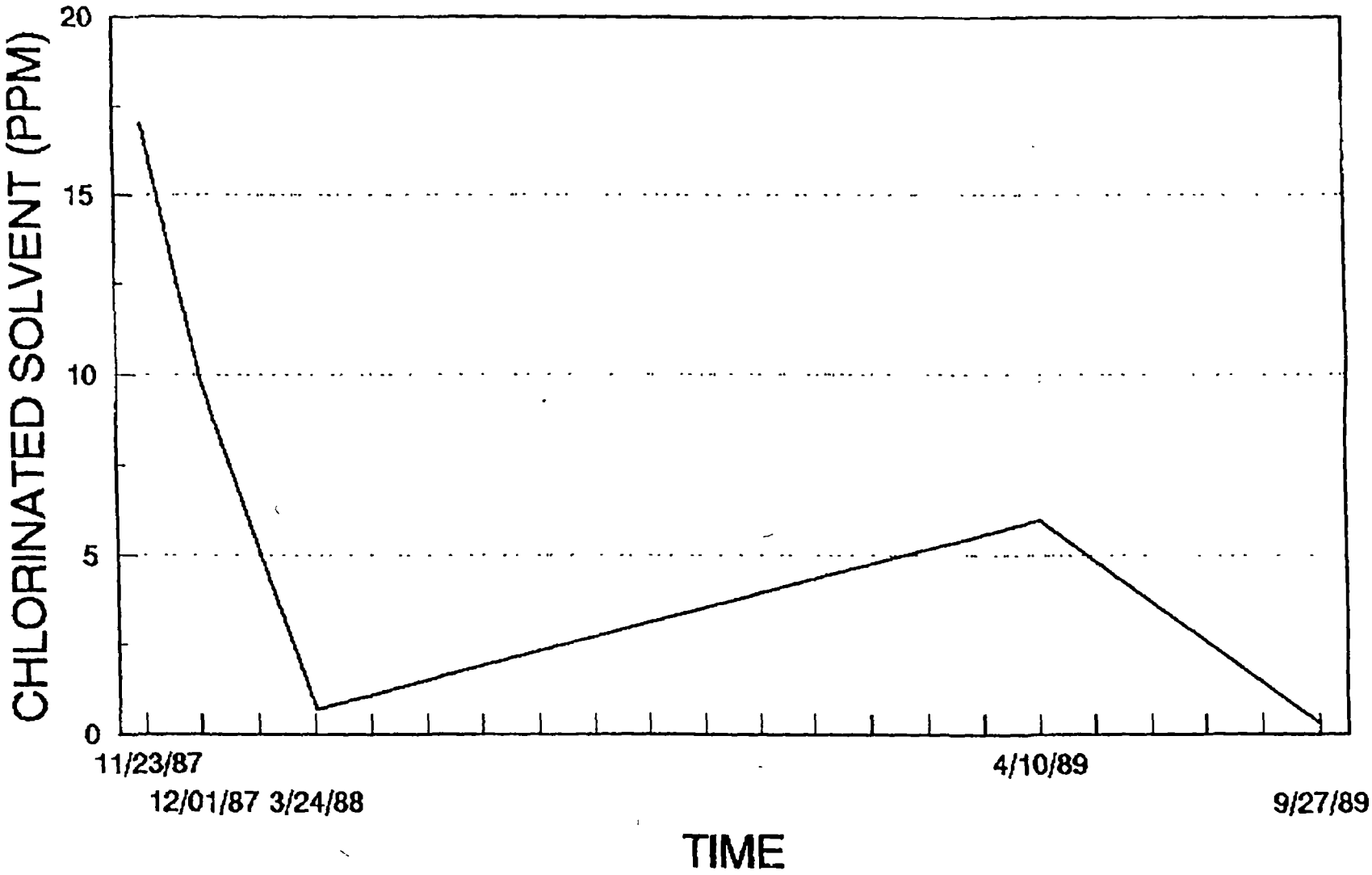
L. L. BLAIR

/r
Attachment

cc: W. C. Achinger
L. Y. Buhl

CHLORINATED SOLVENT CONCENTRATION VS TIME

DAYTON THERMAL PLANT



RECOMMENDATIONS FOR POST HOLE AREA INVESTIGATION AT DAYTON THERMAL

The following scope of work should be implemented to investigate the area in Building 40B at the Dayton Thermal plant where water contaminated with volatile organic compounds was discovered during attempted installation of a guardpost.

* One boring should be installed through the current opening in the plant floor to a depth sufficient to assess the vertical extent of contamination, if any.

* Four borings should be made approximately 20-30 feet from the boring described above and 90 degrees from one another. Each boring should be made to a depth sufficient to assess the vertical extent of contamination, if any.

* Consultant/Contractor should secure the approval of SEPCA before proceeding to depths greater than 20 feet.

* Samples should be collected to depth for each boring and screened for the presence of volatile organics. Visual observations of significance should be noted.

* Approximately five feet of boring should be completed below the depth that produces screening samples showing no evidence of contamination.

* A sufficient number of samples should be submitted from each boring for laboratory analysis to confirm the presence or absence of contamination as determined from the screening process. A minimum of two samples shall be submitted from each boring.

The work described above should be scheduled for a weekend so that no disruptions in plant operations are experienced. Planning and other activities related to the undertaking of this work should be coordinated with plant personnel and SEPCA.

SEPCA
February 9, 1990
lbp/A6-1

ACUSTAR - DAYTON PLANT

Telecopier Cover Sheet

Date: 2/2/90

To: BILL ACHINGER

Telefax Number: 822-7928

Telephone Number: 876-2589

Total Pages Including Cover: 6

From: DOUG ORF

Telephone Number: 848-2461

Notes/Comments: Information that you requested concerning other plants in the area users of 1,1,1 Trichloroethane. Please call if you have any questions.

ACUSTAR

Inter Company Correspondence

	Telephone	Date
	841-6711	February 6, 1990

From - Name & Department			IMS Number
W. J. Drees	Manufacturing Engineering	Dayton	478-05-00

From - Name & Department			IMS Number
L. L. Blair	Manager - Environmental Planning	Acustar	404-02-01

Subject: **ORGANICS IN POWERHOUSE WELL WATER AT DAYTON THERMAL**

In November, 1989, the Ohio EPA made an unannounced RCRA inspection of the plant. While there, a request was made to sample the plant's two wells. The wells supply cooling water for powerhouse equipment. The plant's primary source of cooling water comes from a deep well - 136 feet - in Bldg. 50. The powerhouse has a shallower well - 79 feet - which is used mainly as a backup. The well water samples taken by the State were tested for heavy metals and Volatile Organics.

Although the results of the Bldg. 50 well water appeared to be satisfactory, the powerhouse well contained trace amounts of chlorinated hydrocarbons, about 2 ppm. Of the seven species detected, three compounds made up 75% of the total and were about 25% each. They were 1,1,1-trichloroethane, trichloroethene, and tetrachloroethene. In addition, separate and independent tests by the plant basically confirmed the State's findings.

Because the State is concerned with the presence of these materials and wanted to reconfirm them, a second sample was taken. The results, however, are not yet completed. In discussions with the State, again they expressed concern but indicated this is not an uncommon situation. Chlorinated hydrocarbons have also been found in other industrial wells in the Dayton area.

In an effort to better understand the organic materials in the powerhouse well we a program should immediately initiated. Here are my recommendations:

1. Convert, for the time being, the powerhouse well from a backup to a full well and use the Bldg. 50 well to supplement the plant's needs, if necessary.

ORGANICS IN POWERHOUSE WELL WATER AT DAYTON THERMAL

2. After one week of full-time operation, four weeks and monthly thereafter, take a representative sample from the powerhouse well for analysis. Since heavy metals do not appear to be a problem, analyze for the same organic materials as the State did on their analysis of 11/29/89.

3. Record the results of the analyses.

As the analytical results are obtained, we can review the data to determine whether any regular trends of patterns are observed. This may help to explain the presence of the organic materials.

At this time, I would suggest the above program be continued for a period of at least six months. At the end of that time, we can evaluate the entire situation and consider what further action may be required.

L. L. Blair

L. L. BLAIR

/r
Attachment

cc: W. C. Achinger
L. Y. Buhl

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February 9, 1990
lbp/A6-1

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SEPCA
February 9, 1990
lbp/A6-1

Inter Company Correspondence

Telephone

Date February 16, 1990

To — Name & Department | | CIMS Number

L.L. Blair | MGR, Envir. Planning | 404-02-01

— Name & Department | | CIMS Number

W.C. Achinger | MGR, IW & SFC | 416-15-14

Subject: Dayton Thermal Power House Well Water Contamination
RE: Your Letter of 2/6/90 to W.H. Drees

I am writing to you to express my concerns about your recommendations to Mr. Drees regarding the organics found in their power house well water.

Your recommendations have the potential of placing the corporation at risk for the following reasons:

1. Discharges can violate the NPDES permit parameters since the plant will be discharging a known unauthorized contaminant into the storm sewer.

2. If you still believe the study is necessary, at a minimum, one of the following must be done:

   A). Install an activated charcoal filter bed downstream of the well to insure that all well water passes thru the charcoal filter to insure storm sewer discharge compliance.

   B). Reroute the well water discharge to IWTP for treatment and/or to test for compliance with POTW parameters prior to discharge. However, the IWTP capacity will likely preclude this for any appreciable length of time.

3. Any discharge of this water to the POTW or the storm sewer will require approval by the regulatory agency.

I suggest that you reevaluate your recommendations.

If you have any questions regarding this, please call me at 8-876-2589.

W C Achinger/mpm

W.C. Achinger

cc: D.L. Carlson
P.R. Gilezan
M.W. Grice
R.W. Johnson
N.P. McKay

ChesterLab
A Division of
TheChesterEngineers
4990 Grand Avenue
Pittsburgh, PA 15225
Phone (412)-269-5700

Laboratory Analysis Report
For
CHRYSLER MOTORS
ACUSTAR
DAYTON, OHIO

Report Date: 01/19/90

ANALYSES

	BOILER HOUSE WELL PUMP OUTLET S.P.
Source	#1,#2,#3,#4
Log Number 90-	00282
Date Collected	1/11/90
Time Collected	10:30 A.M.
Date Received	1/12/90
ACROLEIN, UG/L	<10
ACRYLONITRILE, UG/L	<10
BENZENE, UG/L	<10
BROMOFORM, UG/L	<10
CARBON TETRACHLORIDE, UG/L	<10
CHLOROBENZENE, UG/L	<10
CHLORODIBROMOMETHANE, UG/L	<10
CHLOROETHANE, UG/L	<10
2-CHLOROETHYLVINYL ETHER, UG/L	<10
CHLOROFORM, UG/L	<10
DICHLOROBROMOMETHANE, UG/L	<10
1,1-DICHLOROETHANE, UG/L	13
1,2-DICHLOROETHANE, UG/L	<10
1,1-DICHLOROETHYLENE, UG/L	85
1,2-DICHLOROPROPANE, UG/L	<10
cis-1,3-DICHLOROPROPENE, UG/L	<10
trans-1,3-DICHLOROPROPENE, UG/L	<10
ETHYLBENZENE, UG/L	<10
METHYL BROMIDE, UG/L	<10
METHYL CHLORIDE, UG/L	<10
METHYLENE CHLORIDE, UG/L	<10
1,1,2,2-TETRACHLOROETHANE, UG/L	20
TETRACHLOROETHYLENE, UG/L	<10
TOLUENE, UG/L	79
1,2-TRANS-DICHLOROETHYLENE, UG/L	132

350020

* Unless otherwise noted, analyses are in accordance with the methods and procedures outlined and approved by the Environmental Protection Agency and conform to quality assurance protocol.
* "Less-than" (<) values are indicative of detection limit.

Laboratory Analysis Report
For
CHRYSLER MOTORS
ACUSTAR
DAYTON, OHIO

Report Date: 01/19/90

ANALYSES
(Continued)

	BOILER HOUSE WELL PUMP OUTLET S.P. #1,#2,#3,#4
Source	
Log Number 90-	00282
Date Collected	1/11/90
Time Collected	10:30 A.M.
Date Received	1/12/90
1,1,1-TRICHLOROETHANE, UG/L	714
1,1,2-TRICHLOROETHANE, UG/L	<10
TRICHLOROETHYLENE, UG/L	666
VINYL CHLORIDE, UG/L	12

350020

* Unless otherwise noted, analyses are in accordance with the methods and procedures outlined and approved by the Environmental Protection Agency and conform to quality assurance protocol.
* "Less-than" (<) values are indicative of detection limit.

ACUSTAR

W. C Aekinger
12/4

Inter Company Correspondence

To Name & Department			Telephone / Date / CIMS Number
			841-6711 / November 29, 1990
R. W. Johnson	Vice President, Product Planning/Development	Acustar	404-02-02
From -Name & Department			CIMS Number
L. L. Blair	Environmental Planning Manager	Acustar	404-01-01

Subject **TRIP REPORT FROM DAYTON THERMAL**

A trip was made to the plant on November 19-20. The purpose of the visit was prompted by the discovery of a potentially serious environmental problem. During the demolition of the old Maxwell Complex building and the removal of the cement floor, an oil/water separator, which was part of the building's storm sewer, was found to contain a suspicious sediment. This storm sewer is one of two major legs servicing the old structure.

As a precautionary measure, a grab sample of the sediment was taken and sent out for analysis. The test results indicated high levels of chromium compounds, 21,200 ppm. An E.P. Toxic test was also performed on the sediment. It was determined to be RCRA non-hazardous. The latter is an indication the chromium compounds in the sediment are relatively insoluble in water. Nonetheless, this type of material should normally never be found in a storm sewer system.

The Maxwell Building was built in 1915/16. It has been used as a warehouse for at least the past ten years. Although the compounds in the sediment now do not appear to be soluble, there is concern the sediment formerly contained soluble portions which may have leached into the soils and/or been discharged to nearby surface waters. It may not be possible to pinpoint the origin and deposition time of the chromium compounds.

The plant properly responded to the situation by immediately contacting the Ohio EPA's Office of Emergency Response and the National Response Center. They informed the agencies that an action plan was in effect. The written report which is required within 15 days has been sent. The original incident was reported on November 10, 1990.

At the time of the discovery of a potential release, several smaller firms, with limited capabilities, were addressing plant environmental needs. A memo was sent to the plant recommending the services of a larger consulting firm; one that offered a full range of services. The plant interviewed four firms. They selected Mathes (Burlington Environmental). I believe Mathes can meet our requirements.

Following the discovery of chromium compounds in the storm sewer oil/water separator, several downstream catch basins were also examined. They contained lesser amounts of chromium compounds. All the sediment from the Maxwell Building separator and catch basins have been removed and placed in a rolloff box. This material will be analyzed for proper disposal. In order to determine whether any chrome was being discharged from the storm sewer water, a sample was taken from the last outfall and analyzed. No chromium compounds were detected.

A meeting was held at the plant on Tuesday, November 20, to discuss the overall situation, action plan, and Ohio EPA concerns. Mathes distributed a draft of their proposed work plan. Mathes was also assigned overall responsibility for the coordination of the environmental program. A full-time field engineer is on-site and overseeing the excavation and addressing environmental issues as they arise. Based on the day's discussion, it did not appear that the architect for the project had a contingency plan for environmental problems. Some delays in this building program can be expected.

During our walk-through of the area being demolished, numerous questions were asked by Mathes regarding other areas of environmental concern. They also asked whether a Phase 1 Environmental Site assessment (ESA) had been performed. It was indicated none was performed. They said an ESA would be very helpful in addressing suspected areas of environmental concern.

Based on the information gathered to date, it is too early to predict the magnitude of problems with any degree of certainty. We should know more after the soil boring program commences and we begin to receive analytical results. The age of the structure, however, as well as unknown past manufacturing and disposal practices are cause for concern. The confirmation of chrome in several places, suspected chrome in other locations, other unrelated areas of environmental concern and past indication of chlorinated hydrocarbons all contribute to an unfavorable picture. It is likely that substantial funds may be required for environmental cleanup.

Lou

L. L. Blair

LB14/vl

cc: W. H. Drees
P. R. Gilezan
M. W. Grice
D. W. King
J. A. Kozlowski
W. D. McCurley
W. F. Smith

MEMO: To Files
FROM: D.Y. Wright
RE: Site Inspection
Chrysler Dayton Plant
FILE: 3040.064
DATE: December 7, 1987

CC: J.T. Mickam
G.A. Swenson
J.R. Heckathorne

On Monday, November 30, 1987 and Tuesday, December 1, 1987 I visited the Chrysler Plant in Dayton, Ohio for the purpose of developing a work plan to investigate the source of the Waste Oil and 1,1,1 - TCA found beneath the floor in an area located in Building 40b. I met with George Higgs, the engineer in charge of operations. Also present was Vern Allen who is in charge of the waste disposal. We discussed the situation in general and then inspected the area. The results of the discussion and inspection follows.

Apparently while a contractor was installing some guard posts within the plant a hole was cut in the concrete flooring. During the cutting procedure, oil and water was observed oozing out of the cuts. Beneath the concrete was a 6 inch layer of till which covered a thick reinforced concrete slab apparently used at one time for the base of a large press. The size of this slab is presently unknown. Oil/water was observed flowing into the hole through the fill material predominantly from the northern side. Work was then discontinued, and a sample of the oil and water was collected and sent to a local laboratory for analysis. The results of the analyses are attached. In general, the oil contained mixed alkanes at a concentration of 42,700 mg/kg. The water layer contained 10,900 ug/l of 1,1,1-trichloroethane, 288 ug/l methyl ethyl ketone and a number of other chlorinated organics. The oil and water in the hole was then removed and placed in a waste oil area for later disposal. The following day the hole was filled to just below the base of the concrete floor with the water and approximately 1 inch of oil. This was the condition which I observed on November 30, 1987.

During the inspection, the plant layout was discussed. It appears that the plant was originally constructed in the 1920's. Additions and modifications have been completed over the years and are still being completed from time to time. Some of the old structures encountered during some of the work included reinforced concrete pads and concrete pits which used to hold hydraulic oil for some of the machinery. Several areas in the vicinity of the new hole have been excavated recently for the purpose of installing a new drainage system. No water or oil was found in any of these areas.

Some of the structures known to have existed in the area of the discovery include a degreasing station located 50 feet south which was an above-grade facility and a subgrade waste oil sump located 20 feet southwest which was constructed of concrete and recently filled in.

Bldg 40B TCA Source

Potential Source Areas
Dayton Thermal Products Plant
Dayton, OH

Potential source areas were determined by elevated PID readings and concentrations of the compounds in soil samples collected from shallow depths (1 to 6 feet bg)??, and from other published reports and correspondence. Previous investigations have identified the following areas as potential source areas:

John Mathes Recon Investigation, June 28, 1991:

- east foundation of Building 40B, freon degreaser
- northeast side of Building 40A, 1,1,1-TCA degreaser
- central portion of Building 40B
- southwest portion of Building 59
- Building 40A and 40B
- south of Building 53, adjacent to 1,1,1-TCA tank
- storage area east of Building 50

mark on maps

Clean Tech Site Investigation Report, September 1995:

- south side of building 53 and north side of Building 40, TCA tank and TCA sludge tank,
- south end of Building 53, TCA degreaser station
- northeast area of Building 40A, TCA degreaser
- middle of Building 40A, CFC-113 degreaser
- Building 47, 50 gallon chromium paint spill
- Building 50, overfill TCA tank (unknown quantity)
- near Building 50, 35 gallon untreated flux rinse wastewater
- near Building 53, unspecified quantity of TCA from a tank
- primary is TCA tanks, secondary east of Building 50, waste storage area near Building 47.

November 16, 1998
S:\TECH\3CHRY\DAYTON\INPROG\SOURCES TCE

* also include Bldg 50 sump area

CHRYSLER CORPORATION
DAYTON THERMAL PRODUCTS
DAYTON, OHIO

POST HOLE IN BULIDING 40B GROUND-WATER ANALYTICAL SUMMARY
RESULTS ARE IN MICROGRAMS PER LITER (ug/L)

COMPOUND	11/23/1987	12/01/1987	03/24/1988	04/10/1989	02/20/1990	03/06/1990
TETRACHLOROETHYLENE	286.0	189.0	24.8	7.8	7 2	
TRICHLOROETHENE	308.0	169.0	13.3	73.3	23.0	15 5
CIS-1,2,-DICHLOROETHYLENE	2,470.0	--	21.4	1,230.0		
TRANS-1,2-DICHLOROETHYLENE	--	--	--	--		
1,1,1-TRICHLOROETHANE	10,900.0	6,700.0	279.0	41.2	29.0	12.5
1,1,2-TRICHLOROETHANE	43.8	--	--	--		
1,1-DICHLOROETHANE	2,800.0	2,060.0	90.0	1,360.0	144.0	606.0
1,2-DICHLOROETHANE	--	550.0	--	--	15.3	
1,2-DICHLOROETHENE (TOTAL)					191.0	348.0
1,1-DICHLOROETHENE	135.0	101.0	4.5	19.9	5.0	
VINYL CHLORIDE	--	--	--	--		
MEK (2-BUTANONE)	288.0			337.0	540.0	25.0
1,2-DICHLOROBENZENE	14.3					
METHYLENE CHLORIDE	--	125.0				
ETHYLBENZENE			178.0		8.3	
XYLENES			88.0		57.8	
ACETONE				3970	2290	212
CHLOROETHANE				3430	238	1810
CHLOROETHENE				25.5		
4-METHYL-2-PENTANONE					44	
TOLUENE					4.9	
2-HEXANONE					108	

NOTE 3/24/88 AND 4/10/89 SAMPLES COLLECTED FROM "HOLE IN CONCRETE BY STAIRWAY"

Department of Water
Division of Wastewater Treatment
(937) 333-1501
FAX 333-1826

City of Dayton, Ohio
2800 Guthrie Road
Dayton, OH 45418

www.daytongov.com

July 28, 2000

Mr. Gary A. Peters
Howard & Howard Attorneys, P.C.
The Pinehurst Office Center, Suite 101
39400 Woodward Avenue
Bloomfield Heights, MI 48304-5151

DAIMLERCHRYSLER DOCUMENT CONTROL NO.
5C001.08072000 002

RE: DaimlerChrysler's June 29, 2000 request for re-use of water discharge from a soil vapor recovery system of approx. 100 gallons per day into current process wastewater stream.

Dear Mr. Peters:

This letter is in reply to your June 29, 2000 request for a modification of Industrial Wastewater Discharge Permit No. CHRY-012-01, to include additional source waters from activity not mentioned in the original application.

Your letter says the following:

"...DaimlerChrysler's Dayton Thermal Plant will be installing a high temperature catalytic oxidizer and water scrubber at its facility to process air from a soil vapor recovery system. I have attached a DaimlerChrysler Interoffice Memorandum regarding the operation of the system. As you will note from your review of the attached, DaimlerChrysler is proposing to re-use approximately 100 gallons of water from this system per day. Dayton Thermal then proposes to treat the water with its other process water and ultimately discharge it to the City of Dayton's POTW."

Wrong Term scrubber water for make up in Plant operation

The Wastewater from the soil vapor recovery system, as referenced in your request, will be accepted by the City of Dayton Wastewater facilities, subject to the following conditions:

a. This special discharge permission applies only to the waters described in the June 29, 2000 letter from DaimlerChrysler (Howard & Howard Attorneys, P.C.; Gary A Peters). This approval pertains only to the quality and quantity of the water (soil vapor extraction system condensate and entrained waters – which are treated prior to discharge) that DaimlerChrysler is proposing to discharge to the City of Dayton Wastewater Facilities. The City of Dayton, Division of Environmental Management request all data resulting from past groundwater contamination activities including, at a minimum, all analytical results from soil samples taken at this site to date, maps depicting all sampling locations utilized in obtaining above soil samples, and copies of the analytical results/reports provided to DaimlerChrysler from contracted laboratories. This approval has no bearing on groundwater contamination issues, requirements, or activities at the 1600 Webster Street location with which the City of Dayton and DaimlerChrysler are involved. OK

AUG 3 - 2000

Please send above data to:

City of Dayton/Division of Environmental Management
Attn: Jim Shoemaker
320 W. Monument Avenue
Dayton, Ohio 45402

b. This special discharge permission applies only to the time from August 1, 2000 through July 31, 2003. *This special discharge must be completed during that time frame; and a request for extension must be submitted ninety days prior to the deadline stated above.*

c. The discharge must conform to all applicable sections of Industrial Wastewater Discharge Permit (IWDP) number CHRY-012-01 for DAIMLERCHRYSLER - Dayton Thermal Products.

d. For the purposes of the IWDP, these wastewaters will be considered a "dilution" wastestream, which term is found in combined wastestream formula guidance.

e. The wastewaters generated by the soil vapor recovery system must be treated, using activated carbon, and/or suitable technology to remove pollutants to the degree required to attain conformance with: the City of Dayton Sewer Use Ordinance; the Industrial Wastewater Discharge Permit; Alternative Categorical Standards for Metal Finishing Existing Source as found in the IWDP; and City of Dayton Local Limits as found in the IWDP.

f. The wastewaters must be tested prior to discharge for all regulated parameters as found in the IWDP – including each parameter on the list of TTO's (in Part 3 A. 3., above.), and the regulated parameters (such as metals, pH and cyanide), as found in Table 1 and Table 2 of the IWDP.

g. Sampling methods, analytical methods, preservation and holding times must be those delineated for wastewater, as found in 40 CFR 136

h. For *treated* wastewater to be discharged from the soil vapor extraction system, a *representative* sample must be obtained from the stirred – or otherwise well mixed – treated wastestream; and tested **semi-annually** for total toxic organics (TTO's), in order to assure that the sample meets all standards and conditions of the IWDP due to the introduction of this new source of TTO's.

i. Based upon an inquiry of the person or persons directly responsible for managing compliance with the standards for total toxic organics, DaimlerChrysler representatives certify monthly that, no dumping of concentrated toxic organics into the wastestream has occurred since filing the last TTO Certification Statement. Due to the introduction of a new source of toxic organics, the facility must update its current Toxic Organic Management Plan (TOMP) that is currently on file with the City of Dayton, Division of Wastewater Treatment, to reflect these changes resulting from soil vapor extraction system discharges. This update must be submitted prior to any discharge from the soil vapor recovery system/remediation activity.

j. Because the dilution effect of this water – if combined with normal process wastewater at the official IWDP sample location – may invalidate current permit limits due to changes in the combined wastestream formula factor. The increase of dilution water at the sample point will lower current permit limits in relation to the increase of dilution water.

k. The wastewater is to be discharged at a moderate & relatively uniform rate throughout the normal discharge day, rather than discharged as a batch over a short time interval. The discharges must not exceed the available sewer capacity. N/A ? No

l. A log of discharges from the soil vapor extraction system must be maintained and furnished to the city upon completion of the project. For *each* event, this log is to record the date and time period for the discharge, the total volume of waters discharged, required analytical results (as in **h.** above) for each discharge, and the signature of the person in responsible charge of the discharge.

m. The pH of discharges into the Dayton Wastewater Facilities must be within the range of pH 6.0 to 12.0 at all times. Please review the enclosed Dayton Sewer Use Ordinance for other limitations, particularly Section 52.06 – "Conditions to use the City's Wastewater Sewers" – B. "Prohibited Discharges." OK

n. DaimlerChrysler shall not discharge to the sewer system in such amounts or rates, or at such times, that the addition of this wastewater would likely cause or contribute to surcharging of the City of Dayton sanitary sewers. OK

o. The discharge may be subject to sampling by Division of Wastewater Treatment personnel, as necessary. DaimlerChrysler shall provide notice of the date and time of the discharge events to Lyle Merta, Sharon Vaughn, or Beau Dodge, Industrial Pretreatment Staff for the City of Dayton, Division of Wastewater, at 937- 333-1501, in order to provide them the opportunity to monitor the discharge. daily ?

p. DaimlerChrysler shall pay all costs attributed to this discharge. Costs shall be assessed at the discretion of the Director of Water and in keeping with Section 50.03 of the Revised Code of General Ordinances, Assessment Rates and User Charge System, and other provisions as provided by law. DaimlerChrysler will also be responsible for the costs of labor and equipment incurred by the City of Dayton Department of Water for activities such as providing access to the sanitary sewer or conducting inspections of the project. **Billing issues will be addressed and approved by the City of Dayton, Division of Water Engineering. Contact Julie Cogliano (937) 333-3736.** ? How often open.

q. Should the actual discharge present unforeseen problems, additional control measures may be required of DaimlerChrysler. The City of Dayton reserves the right to modify the acceptance of this wastewater if the wastes are ever found to be incompatible with the efficient operation of the sanitary sewer system and treatment facilities. This acceptance does not imply that DaimlerChrysler, is free of liability for any unforeseen consequences of the discharge. OK

r. This acceptance of the discharge does not relieve DaimlerChrysler, from complying with any other applicable federal, state, and local laws, ordinances, rules or regulations. OK

s. DaimlerChrysler, shall indemnify, defend and hold free and harmless the City of Dayton, its agents, officers, and employees, from and against any and all actions, claims, liabilities, assertions of liabilities, losses, costs and expenses whatsoever, including but not limited to attorney's fees, which in any manner may arise or be alleged to have arisen or resulted or

alleged to have resulted from the discharge or release of any nature whatsoever by DaimlerChrysler, of hazardous substances or pollutants to the City of Dayton sewer system and/or wastewater facilities.

t. DaimlerChrysler, on behalf of itself, its employees, and agents, releases the City of Dayton, its agents, officers, and employees from any and all known and unknown causes of action, damages, liabilities, costs, expenses and claims and demands of whatsoever kind or nature which DaimlerChrysler, now has or may ever have against the City which result from the discharge or release of hazardous substances or pollutants placed in the City of Dayton sewer system and/or wastewater facilities by DaimlerChrysler.

u. As in the past, the City of Dayton continues to discourage the long-term discharge to the sanitary sewer of waters related to remediation activities. While the protection of our drinking water remains of utmost importance, the City expects that DaimlerChrysler will work diligently to achieve the earliest reasonable opportunity to discontinue this discharge. OK

If you have any questions, please feel free to call Sharon Vaughn, Industrial Pretreatment Coordinator, at (937) 333-1860.

Very truly yours,

Thomas R. Schommer

Thomas R. Schommer, Manager
Division of Wastewater Treatment

Enclosure (2) - City of Dayton Sewer Use Ordinance No. 29641-98
DaimlerChrysler Interoffice Memorandum

TRSSV/sv

cc: Sharon Vaughn – Dayton (w/o Enclosure (1) - Sewer Use Ordinance)
Lyle Merta – Dayton (w/o Enclosure (1) - Sewer Use Ordinance)
Beau Dodge – Dayton (w/o Enclosure (1) - Sewer Use Ordinance)
Julie Cogliano – Dayton (w/o Enclosure (1) - Sewer Use Ordinance)
Scott Holmes – Dayton (w/o Enclosure (1) - Sewer Use Ordinance)
Jim Shoemaker – Dayton (w/o Enclosure (1) – Sewer Use Ordinance)
Mr. Joe Whitlock, Environmental Coordinator
DaimlerChrysler Dayton Thermal Products
1600 Webster Street
Dayton, OH 45404

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INTEROFFICE MEMORANDUM

TO: **Ken Vogel**

FROM: **Kristin Yahnke**

DATE: **September 9, 2000**

SUBJECT: **Dayton – Disposal Options for Scrubber Water**

Due to issues with the Dayton Thermal Product Plant Industrial Wastewater Permit No CHRY-012-01, alternate disposal options for the scrubber water have been evaluated. The VOC concentrations (primarily trichloroethene [TCE]) utilized for design of the catox/scrubber system are the basis of the budgetary costs that are provided. Taking into account these VOC concentrations, the design discharge rate for the scrubber is 10 gallons per hour (gph) and this is the rate utilized for calculations. Before shutdown, due to low influent VOC concentrations from the building 40B location, the scrubber was discharging at 4 gph. From ground-water concentrations, it is known that in the vicinity of building 50 (future location of the system), tetrachloroethene (PCE) is the primary compound of concern and is present in the ground water at a ratio of approximately 20 times the concentration detected in the building 40B vicinity. The significance of this is that if the PCE concentration is significantly higher in the building 50 vapor stream, additional water will be utilized for neutralization. This is due to the fact that PCE has one more chloride than TCE resulting in the generation of additional hydrochloric acid. Therefore, the estimated costs for disposal could be an over estimate by 50% or an underestimate by 100%, depending on the vapor stream at building 50. The cost estimate for Freedom and S&D are based on previous work, but are only budgetary LBG costs for preparation of modification plans and the additional time required for managing the water disposal have not been included.

Onyx was contacted to determine the costs associated with offsite disposal of the water as a non-hazardous waste The price per gallon was estimated to be $0 30. The water would be disposed in Indianapolis, IN, which is the nearest DaimlerChrysler approved facility. The roundtrip will take Onyx 5 hours at $65/hour or $325 per trip Onyx indicated that there was a facility located two hours away (2 hours at $65/hour or $130 per trip) in Middletown, OH, however the facility is not DaimlerChrysler approved. The facility is United Wastewater Corporation out of Cincinnati and Company President

Dave Brown can be reached at (513) 733-4666 to arrange for an audit. Onxy does not have room to temporarily store water, and their tanker truck has a capacity of 5,000 gallons.

OPTIONS

1. Batch Treatment: The option would involve establishing a relatively high pH (near 10) in the scrubber and running the system until the scrubber water pH is 3, which would result in system shutdown. At the design VOC concentration, the system would shutdown at approximately 48-hours and the 250 gallon scrubber tank would have to be pumped off. The scrubber tank would have to be manually refilled and adjusted to a pH of approximately 10. To dispose of the water at the Indianapolis facility by this option would be an annual cost of $73,200 ($37,151 at Middletown). This option would require modification to the current program configuration for the operation of the scrubber. Catalytic Combustion has cautioned that this would not be the recommended way to operate the catox. Additional operator costs to monitor refilling of the system was not calculated.

2. 1,000 Gallon Heated, Holding Tank: This option would involve the procurement of a 1,000 gallon storage tank and heater for an estimated cost of approximately $6,000 (including shipping). A discharge rate of 10 gph results in the tank having to be pumped down approximately once every 4 days Modification to the main SVE control panel would have to be made to accommodate the tank heater The scrubber panel would have to be modified to account for the high-high level switch on the holding tank to shutdown the catox/scrubber to prevent overflow. Catalytic Combustion would modify the panels, however additional field wiring would be required. To dispose of the water at the Indianapolis facility by this option would be an annual cost of $56,875 ($39,130 at Middletown) The installation of the holding tank at building 40B would result in additional subcontractor expenses of approximately $8,000 to $10,000. If the plant would allow additional space out side (acquisition of parking spaces), the fence would have to be extended and a 12' x 4'concrete pad would have to be poured. Minimal additional piping and electric conduit would have to be run if the tank was installed outside If the additional parking spaces would not be available, the tank would be located inside building 40B at the formerly proposed location for the free product tank. A stand would have to be constructed so the tank would be out of the way for forklifts, conduit and level control wire would have to be run between the tank and the scrubber, and the existing discharge piping to the sump would be extended to the holding tank. Additionally, with the tank located inside the facility, security would have to let Onxy in to 40B to pump the tank down The cost of the installation of the holding tank at the building 50 location is considered minimal as it would only involve a small addition to the concrete pad and a few feet of additional conduit and discharge piping